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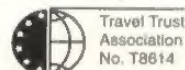
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COVER STORY

NATO stands firm: Allied F-16s are playing a vital role in the unfolding Kosovo crisis, with a Royal Netherlands AF example having claimed one of the first air-to-air kills of the conflict. For our first coverage of Operation 'Allied Force' see the *Airpower* special on pages 16 and 17. *Ted Carlson/Fotodynamics*

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LOOK OUT FOR NEXT MONTH'S EXCITING ISSUE OF AIRCRAFT ILLUSTRATED on sale from 14 May

BAe launches new Avro

British Aerospace (BAe) is 'conditionally' offering a new version of its Avro regional jet, the **Avro RJX** in 70, 85 and 100 seat variants to airlines world-wide. The announcement, made at the Australian Air Show in Avalon, follows the achievement of pre-launch engineering goals and the selection of the powerplant.

The new Avro family will be powered by **AlliedSignal's AS977-1A**, instead of the LF507 offered on the current Avro aircraft. BAe officials say the new engine will further reduce the noise level of the aircraft, already said to be the quietest commercial jet aircraft ever. The new Avro RJX family will offer operators significant improvements over the existing Avro RJ including: an increased range of about 17%, an extra 5% thrust in climb, a 15% reduction in fuel burn and a reduction of approximately 20% in overall direct engine maintenance costs. The latter reflects the fact that the new AS977-1A will have 40% fewer engine parts.

The increased range will allow airlines to open new thin routes. More European airlines, such as Finland's **Finnair**, will be able to offer jet service to London's downtown City airport where current generation Avros and their predecessors, the **BAe 146**, are the only turboprop aircraft meeting the airport's strict noise restrictions. Other new routes accessible to the Avro RJX include services between Australia's Eastern Coast and New Zealand, currently only served by bigger and heavier aircraft.

Subject to business conditions, project definition and the commitment of more risk share suppliers, BAe plans a formal launch for Autumn 1999, British certification in December 2000 and service entry in May 2001. **ec**

Latest alliances in doubt

US carrier **Delta Air Lines** talks with **Air France** has raised questions about the future of the Qualiflyer alliance. The other alliance members — **Austrian Airlines**, **Sabena** and **Swissair** — are talking about the future of their link-up across the Atlantic Ocean but officials refused to divulge more details.

However a spokesman pointed out that Delta's continued talks with Air France might raise questions about the US carrier's commitment to the programme.

Delta spokesman **Todd Clay** said the US carrier was seeking to expand its code share agreement with the French state-owned carrier and to become its exclusive US partner in a global alliance. Currently, Air France has code share agreements both with **Continental Airlines** and **Delta** but the French airline has announced it will choose a single US partner by the end of 1999.

Delta's increased co-operation with the French carrier is sure to displease its Qualiflyer partners, especially **Sabena** and **Swissair**, which view Air France as a strong competitor. Mr Clay says the airline believes whatever agreement

it may reach with Air France will not affect its relationship with its other partners, because the code share agreements between the four carriers are mutually beneficial.

However, **Swissair** has indirectly warned Delta Air Lines that it will seek to add another US carrier to the Qualiflyer alliance, probably

Noise rules delayed

In an attempt to appease inflamed trans-Atlantic relations, the **European Commission** has delayed adoption of rules banning aircraft fitted with **hush-kits** from European skies.

A **Transport Commission** spokeswoman said the new legislation would not be agreed to until possibly April in order to allow for more discussions with US officials, which says the new rules on hushkits would harm the US aviation industry.

However, the spokeswoman ruled out revising the draft, adding 'it has been postponed because it's causing so much consternation in the United States, but we do not agree with the US argument that it is discriminatory or that it falls under (World Trade Organisation) rules.'

On 29 March EU transport ministers were expected to approve a legislation prohibiting the registration in Europe of aircraft with hushkits after 1 April 2000, despite strong opposition from the US government.

Rotary club

Negotiations announced last April to merge the **Westland** and **Agusta** helicopter interests of the UK's GKN and Italian Finmeccanica industrial groups, resulted in the signing of Heads of Agreement in March, for the formation of a 50:50 joint venture company.

From the UK, the joint venture will involve GKN Westland Helicopters, the transmission business of GKN Westland Aerospace, and GKN's 50% interest in Aviation Training International Ltd, the joint venture with Boeing to provide training support for the British Army's **WAH-64** Longbow Apache fleet. In addition to the Agusta helicopter facility, including its transmissions and structures businesses, the Italian component will add Agusta's shares of the European **NH90** and Bell Helicopter Textron's **BA609** tilt-rotor aircraft joint-venture programmes.

At the core of the Agusta/Westland relationship is the three-turboshaft 15-tonne

RH101 medium-lift helicopters developed and produced jointly by both companies, for which orders for 98 have so far been received from Canada, Italy, Japan and the UK. Other programmes involved in the joint-venture agreement include those for the **Apache** (67 WAH-64 on order), **Sea King** support (over 300 sold) and **Super Lynx** (some 400 in service) from Westland's \$6.3 billion current order-book.

Orders totalling some \$2.2 billion for a wide range of mainly lighter helicopters being fulfilled by Agusta, also include: over 600 **A109s**; new eight-seat **A119 Koalas**; up to 60 **A129s** for Italian Army light attack roles; the six-tonne **AB139** now under development; and support of licence-built Sikorsky **SH-3Ds** and **HH-3Fs** in local military service. Agusta is also involved in support of many of its 4,000 helicopters delivered to date, including many licence-built Bell **AB-47s**, **AB-204s** and **AB-205s**, and Boeing **CH-47s**. **jf**

US Airways, if Delta goes ahead with the extension of its partnership with Air France.

Continental Airlines, the other US contender for membership in Air France's yet to be launched global alliance, is in a similar position as Delta's.

It would gain access to more destinations in Europe, Asia and Africa but it also has a strong relationship with **Northwest Airlines**, which in turn set up the first global alliance, and so far the most successful, by partnering with Dutch carrier **KLM**. It is expected that, as part of its rela-

tion with Northwest, Continental will join the KLM-Northwest partnership, competing directly with any future alliance Air France might launch.

Meanwhile **Alitalia**, **KLM**, **Northwest** and **Continental** are reported to be very close to forming the latest world airline alliance. To be named **Wings**, Air France is also said to be interested to entry in this new alliance.

Sources close to the airlines suggest that an alliance with **Air China** and another Far East Asian airline such as **Malaysian Airlines System** is also possible. **ec**

US officials charge the EU with trying to spur **Airbus** aircraft sales by forcing airlines operating older aircraft, generally US made, to replace them instead of fitting them with noise reducing hushkits.

The US says the EU's proposed legislation is illegal because it goes beyond International Civil Aviation Organisation (ICAO) noise regulations, but the EU retorts it is not aiming at noise but at air pollution from older aircraft which hushkits do not reduce. EU officials say the US is opposed to the proposed legislation because all hushkit manufacturers are based in the US and because US airlines would be unable to sell their older aircraft to European and African carriers as they often do.

The US has threatened retaliatory measures if the legislation is adopted. A US Congress transportation committee has already adopted a measure that, if accepted by a majority of the Congress, would revoke the waiver of US noise regulations granted to the **Concorde**. The aircraft, operated by Air France and British Airways, would be unable to operate in the US without that waiver. **ec**

UK capacity crisis

Planning for a new runway in the **South-east of England** must begin soon if the demand for flights is to be met, the **BAA** has said.

The company reaffirmed its pledge that it would not build another runway at **Heathrow** should its application for a fifth passenger terminal succeed. The four-year public inquiry into the £1.8 billion development, the longest planning hearing in British history, ended in mid-March. The inspector is expected to take up to two years to write his report. Ministers are then likely to deliberate for at least another six months before reaching a decision.

But BAA issued new projections showing that even with **Terminal Five**, which will increase the airport's

passenger capacity by about a third, and other mooted expansions at **Gatwick**, **Stansted** and **Luton**, demand for air travel would outstrip the airports' ability to cope by 2010.

Demand at the region's airports is forecast to rise from 100 million travellers a year now to 138 million in 2010. Without an extra runway, it is estimated that by 2015 about 20 million passengers a year will have to travel long distances to less crowded regional airports, or simply not fly at all.

Sir John Egan, BAA's chief executive, said: 'We are moving rapidly to a situation where all South-East airports will be full and it will be impossible for any more people to fly. This is no way to enter the 21st century.'

The company has been severely critical of the scope for

European unity?

Aerospatiale, **Alenia Aerospazio** and **Fairchild Dornier** are attempting to forge a strategic alliance in the regional transport market.

The three aircraft manufacturers, which in the last few months aggressively promoted rival twinjet concepts, now are attempting to combine Fairchild Dornier's proposed **728JET** and **ATR's AIRjet** in an effort to develop a unified family of 60-90-seat commercial transports.

Embraer's newly announced plan to further extend its regional twinjet family and launch the 70/90-seat **ERJ-170/ERJ-190** this year, as well as **Canadair's** healthy **CRJ** sales, have not weakened the Europeans' and Fairchild Dornier's confidence in an all-new programme.

The would-be partners' schedule foresees a joint authorisation to make offers to potential launch customers as early as April with a midyear go-ahead. The 70-seat aircraft, the family's basic version, would be followed by a shortened-fuselage 60-seat derivative and by a 90-seat aircraft. Such a joint industrial initiative, which would be similar to a consolidation agreement, may require the European Commission's approval.

Fairchild Dornier, which already produces the 30-seat **328JET**, 'prelaunched' the 70-seat 728JET in May 1998. The initiative was strongly backed by **Lufthansa CityLine**, **Lufthansa German Airlines'** regional arm, and **Crossair**, the SAirGroup's regional affiliate. They indicated an intention to order 60 of the 70-seat 728JETs each and to option 60 additional aircraft each. Germany's **Euro-**

wings and France's **Proteus Airlines** also planned to sign commitments for the aircraft.

Both Lufthansa and Crossair played a major role in determining the 728JET's configuration and operational specifications. However, Fairchild Dornier failed to conclude firm orders late last year as it expected.

Crossair still intends to order 60 70-seat-category twinjets and continues discussions with several aircraft manufacturers, a fleet planning manager said. He added Crossair tentatively plans to conclude an order for twinjets by midyear.

The joint programme's work-sharing arrangement and cross-border funding plan is still being discussed. The three participating manufacturers are likely to become equal partners and own a 33.3% stake each in the proposed joint venture. Fairchild Aerospace, Fairchild Dornier's parent company, however, has demanded a 50% share in the programme.

The aircraft's final assembly line could be located near Naples, in southern Italy, where Alenia has ample production capacity.

Recently, the Italian government approved a plan to pour an estimated \$1.9 billion in Finmeccanica/Alenia, including about \$1.5 million in 1999-2001, to support the company's quest for additional business. The funding plan is expected to include Italy's share in a new regional twinjet as well as Alenia's role in the proposed **Airbus A400M** military transport and the **A3XX** very large commercial transport.

In the same vein, Germany is expected to contribute funding to Fairchild Dornier's extended product range. **ec**

Nighthawk 'shoot-down'

Updating our Kosovo special on page 16, a **US Air Force F-117A Nighthawk** had been reportedly shot down near Belgrade during a bombing raid on the Yugoslav capital during the night of 27 March.

The pilot of the aircraft, hailing from the 8th FS at Holloman AFB, NM, was rescued and taken back to Aviano from where the aircraft are currently operating.

The full details had not been announced at the time of press, and despite Serbian claims NATO officials had not revealed if the aircraft was shot down or had suffered a technical fault.

delays in existing planning procedures. If Terminal Five is approved, nine years will have elapsed between the proposals being first published and the start of construction. The need for new runway planning to start is therefore considered urgent.

BAA says it is for the government, not itself, to decide the location of a new strip. But managers intend to make the strongest possible case for additional take-off and landing capacity in the course of ministers' newly-announced airports review.

Gatwick's single runway is already the most intensively used in the world. It will become even busier over the next decade as projected passenger numbers rise from 29 million to 40 million. An agreement between the airport operator and West Sussex county council prohibits a second runway before 2019, though this could be overturned by parliament.

In 1995, a study was launched into the feasibility of a close parallel runway at Gatwick, seen as a less environmentally damaging option. But this was put on hold shortly after Labour came to power.

Meanwhile the first step towards

developing Gatwick's airfield to handle 40 million passengers by 2008 has been taken with work started to divert a 1500 metre stretch of the River Mole.

The path of the river will be moved so that it flows closer to the airport boundary and around the edge of the North west zone, the area earmarked for future development.

At the moment Gatwick is making big moves to limit the numbers of older generation aircraft, (such as BAC 1-11s and B737-200s) in use at the airport. There is a curfew in force for certain aircraft already and this is seen as a move to make the airport quieter before the airport authority push for a second runway.

Under the current expansion proposals, there are plans to install anti noise embankments for new the capacity, thus these will be in place for any runway increase in the future.

The initial expansion in capacity will be achieved with the next generation of aircraft using the airport. The arrival of the **B777**, **A330** and **B747-400s** have helped with the perceived noise problem already. **ec**

AOK for Y2K

The Domsday scenario of a national computer network melt-down at 00.01 hours on 1 January 2000 from the **Millennium bug** has been rejected by the Ministry of Defence. Reporting on the situation in mid-March, defence secretary George Robertson said the UK Armed Forces have a comprehensive Millennium compliance programme, which is expected to achieve its objectives in all front-line units by late summer.

Although the MoD has the largest Millennium Bug programme of all government departments — in fact, as big as their combined total — Robertson said that over 60% of its critical systems had already been fixed, 95% were on track for correction by the autumn, and the remainder would follow by the end of the year. 'I have no doubt that our defence capability will be sustained over the Millennium period and beyond', he added.

Key points in MoD's Millennium bug programme were that no weapon system or ordnance would pose a threat to the civil community from a Y2K malfunction, and, after thorough checks, that no safety risk was involved from the nuclear deterrent. All RAF aircraft were certified as safe to fly from 1 January 1999, and will be declared Y2K mission-capable by 31 May.

Computer systems of RN ships and submarines are being progressively assessed, with the last vessel due for Y2K-compliance clearance by August this year. All army mission-critical equipment, including weapon systems, will be ready by September. **jf**

CIVIL SCENE

Compiled by ALAN J. WRIGHT
and the *AI* news team



Top: JEA's four 50-seat Canadair RJ200s will be used to develop new, thinner routes and also add to the successful Air France franchise operations. Deliveries commence in October 1999, running through to January 2001. Bombardier

Above: Bombardier will also supply 11 examples of the Dash 8. Amongst the aircraft will be four 78-seat Q400s as shown here, making JEA the UK launch customer for the new series. They will be joined by three 37-seat Q200s and four 50-seat Q300s, with deliveries of spread between October 1999 and the third quarter of 2001. Bombardier

JEA re-equips

After many months of planning and negotiation together with detailed evaluation of the types available, **Jersey European** was finally able to announce its fleet re-equipment plans in mid-March. The airline confirmed that it is to acquire 15 new aircraft to enhance its network of UK regional services and develop its partnership with **Air France**.

The newcomers will comprise both jet and turboprop machines to completely replace the current **Fokker F-27s** and **Short SD3-60s** in the fleet. Four 50-seat **Canadair RJ200s** will provide the opportunity to develop new, thinner routes and also add to the successful Air France franchise operations feeding Paris Charles de Gaulle. Deliveries of this type will commence in October 1999, with the final member of the quartet entering service by January 2001.

Bombardier will also supply 11 examples of the **Dash 8**, with JEA becoming the UK launch customer for the new 78-seat **Q400** series, four of which have been ordered by the airline. They will be joined by three 37-seat **Q200s** and four

50-seat **Q300s**, with deliveries of the turboprop types spread between October 1999 and the third quarter of 2001. All of the Q series aircraft will be equipped with the Noise and Vibration Suppression system (NVS), which will ensure an unprecedented low level of noise and vibration in the cabin. They will also have Common Crew Qualification (CCQ) giving JEA significant economic benefits by having pilots able to fly all three models with only minimal differences training. As an interim measure, JEA will also be leasing a pair of used Dash 8-300s from Bombardier in June and July 1999 to provide extra capacity until the deliveries of the new machines are completed.

As a result of the £150 million investment JEA's capacity increase will exceed 40%. This will be achieved with a fleet of 33 aircraft and is undoubtedly the most substantial single expansion ever undertaken by the carrier. There appears to be no reason why the annual growth rate should not continue at around 30%, taking the number of passengers carried annually to over 3 million. An impressive advance from the Twin Otter operation 20 years ago.



A340-500s for SIA

Singapore Airlines has formally signed an agreement for an order for up to 10 **Airbus A340-500s** — a signal that Asia's ailing airlines may be about to turn a corner. Singapore Airlines announced the order for five long range A340s and options on a further five in May 1998 but the contract had not been formalised until now.

The order is the first from a leading Asian airline since mid-1997, when an economic slump in the region cramped demand and led **Cathay Pacific Airways**, **Malaysian Airline System** and **Garuda Indonesia** to defer or cancel aircraft orders.

The signature of the contract for the 313-seat aircraft is also seen as an excellent strategic move for Singapore Airlines. The A340-500 has the longest range of any commercial aircraft currently on the market and will allow the Singapore carrier to open the first non-stop routes between South East Asia and the Western Coast of the USA.

Singapore's competitors in the region are still dealing with the monetary crisis and are financially unable to place a similar order at this time. For up to two years, SIA may find itself in the enviable position of being the sole carrier offering non-stop service between the region and cities such as Los Angeles and San Francisco. The carrier is expecting to receive its first A340-500 by the end of 2002. *EC*

In maintenance

Boeing 727-200 YU-AKD of **Chanchangi Airlines** taken at **Lasham** in mid-March. The ex-Avionex aircraft was present at the **Hampshire** airfield for maintenance, and is shown arriving back from **Bournemouth** where it repositioned for repainting. *Antony Best*

which await approval or application in the case of the Canadian cities. The airline is also evaluating an expansion in its Caribbean services, with extra flights and a second dedicated aircraft being studied. Elsewhere, Richard Branson has made a fresh plea for his airline to be allowed to operate flights to India in competition with **British Airways** and **Air India**.

It has also been reported that Virgin is to enter into a long-term agreement with **Nigeria Airways** to operate between London and Lagos, though this has apparently been denied by the airline. It was suggested that Virgin would operate the route on behalf of the Nigerian carrier using an **Airbus A340**, at the same time assisting in the restructuring of the struggling airline.

In a separate move, Virgin is said to have made an unconditional offer that matches British Airways £75 million agreed bid for **CityFlyer Express**. Virgin chairman Richard Branson, announcing the bid in early March, said if BA succeeds in buying CityFlyer then it would be impossible for anyone in the UK to compete against Europe's largest airline.

Meanwhile, Virgin also proposes to adopt a new image later this year, although no details have been released. Nevertheless, bearing in mind the comments made about the dropping of the Union Jack by BA, it is certain to feature in Virgin's new scheme together with the company's familiar logo. Unofficial sources have indicated that a predominantly silver design will replace the current white and red livery, but it will be September before any unveiling takes place.

Virgin expansion

Virgin Atlantic Airways has announced plans to develop its existing route network and introduce services to new destinations. One of the first will be the addition of the recently-approved Shanghai operation and a daylight flight to New York JFK from July. Others in the offing are Chicago, Toronto and Vancouver

Sabena's scheme

Boeing 737-200 OO-SDJ at **Manchester** showing off Sabena's new colour scheme — the airline's second change over recent years. *Denis Norman*



Airbus news

Air Transat first

Montreal-based **Air Transat** has launched the first phase of its fleet renewal programme with the delivery of the first two **A330-200s** from Airbus. Both aircraft are being leased from **ILFC** and the second is to be delivered this spring. It is also the 15th A330 to be delivered to ILFC, out of a total commitment for 45 A330s by the Los Angeles-based lessor. The 362-seat A330-200s will be used to develop Air Transat's services to Hawaii, Frankfurt and Athens. The new aircraft are the first of the type to be powered by **Rolls-Royce Trent 700** engines, which have been in successful operation on A330-300s for more than six years. *EC*



Qatar takes A320

Qatar Airways has taken delivery of the first of four leased **A320s** from Singapore Aircraft Leasing Enterprises (**SALE**) in March. The Middle East carrier will receive the three other aircraft during March and April 1999.

The four leased A320s will permit Qatar Airways to successfully match growth and expansion over its Middle East regional network and on routes to the Indian subcontinent from its Doha base in Qatar.



Ryanair delivery

The first **Boeing 737-800** for Irish low-fare airline **Ryanair** was delivered on 20 March. The aircraft is part of an order for 25 Next Generation B737s announced 12 months ago. Currently flying six million people per year on 33 European routes, the Dublin-based low-fare airline operates 21 Boeing 737-200s. So far this year, **Ryanair** has launched six new services from Stansted and with the delivery of the new Series 800s, the carrier plans to launch two more new services from London in the summer. *Boeing*



This will be followed by deliveries of the six A320s directly purchased from Airbus Industrie, with these aircraft to be received beginning in 2001.

All the Qatar Airways A320s will be powered by **International Aero Engines (IAE) V2500** engines and will accommodate 144 passengers in a two-class layout. *EC*

Sabena's first A321

Belgian flag carrier **Sabena** has taken delivery of its first **Airbus Industrie** single-aisle aircraft. The aircraft, an **A321**, (registered OO-SUA c/n 970) was delivered from the Airbus delivery centre in Hamburg-Finkenwerder, Germany on 1 March.

The Brussels-based carrier has 26 **A319s**, five **A320s** and three **A321s** on firm order, totalling 34 Airbus single-aisle aircraft — the biggest aircraft order in Sabena's history.

The aircraft are powered by **CFM International CFM56** engines and are fitted with convertible seats, allowing flexible cabin layouts — permitting the number of seats in Business and Economy Class to be adjusted depending on demand. *EC*



Emirates leads

Emirates became the first airline in the Middle East to take delivery of the **A330-200** on 10 March. The aircraft, powered by **Rolls-Royce Trent 700s**, will seat 34 in business class and 251 in economy, but the majority of the other 16 firm orders will have three-class layouts for 243 passengers.



existing markets while providing our passengers with a quiet, appealing travelling environment.

Powers said the CRJ Series 200LR fleet would be employed for growth in the company's route network, to inaugurate service in several new non-stop markets and, in some cases, to replace smaller turboprop equipment. The manufacturer has agreed to provide lease financing for each of the aircraft on favourable terms. Northwest has not selected which airlines would operate the CRJ fleet.

'At Bombardier, we are very proud that starting next year the Canadair Regional Jet will be a part of Northwest's operations,' said Robert Gillespie, president, Bombardier Aerospace, Regional Aircraft, adding that 'the confidence that Northwest has demonstrated in the CRJ with an order of this magnitude is extremely gratifying.' *EC*

Busy World

British World Airlines will be operating a series of domestic scheduled flights on behalf of **Jersey European** this summer using two of its four **BAe ATPs**. The contract, which covers both cabin and flightdeck crews, was effective from the end of March and covers a four month period for one aircraft and two and a half for the second ATP. This duration may be extended in both cases.

One of the machines will enable JEA to provide more capacity on the Southampton-Guernsey route since the introduction of the 66-seat ATP will enable the frequency to be increased of five-times-daily. This compares with the current programme of three return flights per day with a 48-seat type.

Meanwhile BWA has leased an **ATR-72** to **CityFlyer Express** for 30 months starting in April. At this point it will begin flying from Gatwick after a repaint in full BA livery and a change of identity to G-BYTP. Formerly registered G-OILB, it was one of two originally acquired by the Southend-based airline specifically for the contract work involving the movement of Shell personnel between Aberdeen and Sumburgh. In the event, the type's reliability has enabled the duties to be handled by one machine, hence the latest developments. With CityFlyer the ATR-72 will be flown by the airline's own crews with technical support provided by the company. BWA's remaining example (G-OILA) will continue to be based at Aberdeen where Caledonian Airborne supports the operation.

Another BA franchise

The Dutch carrier **BASE Airlines** has become the tenth company to join the **British Airways** franchise scheme. It will bring seven new routes to the network which are flown from Eindhoven and Rotterdam to Birmingham, Gatwick, Manchester and Zurich. It was also planned to add Heathrow to the coverage from the end of March with a twice-daily visit by a 28-seat **Boeing 737** from Eindhoven. In addition to two examples of this type, BASE also operates three 16-seat **Jetstream 31s**, but the airline is actively evaluating 50-seat regional jets for future expansion.

New business

False start

New airline **Baltia Air Lines** has delayed the start of services once again. The airline plans to fly from New York to St Petersburg in a **Boeing 747-200** to be leased from **Cathay Pacific**, but earlier this year a share-issue was abandoned after guarantees were not met.

The lack of funding has now put the St Petersburg route licence, awarded by the US Department of Transportation, in doubt. Baltia is also said to be unable to make a second payment of \$375,000 to Cathay Pacific to secure the aircraft's delivery.

Baltia has had several false starts before. In 1991, it secured leases on two **Scandinavian Airlines System** aircraft, and repainted the wings. However, the airline had to leave the aircraft on the runway because a Japanese investor backed out at the last minute. EC

New Air from New York

An ambitious group of investors are to launch a New York-based low-cost carrier to serving up to 44 cities from Kennedy airport. The airline, temporarily called **New Air**, hopes to start service to five cities this autumn, apparently using both **Boeing 737-700s** and **Airbus A320s**.

The company has raised \$130 million, the largest amount ever for a start-up carrier. It was first called Virgin America as earlier plans called for Richard Branson's **Virgin Atlantic Airways** to hold a controlling stake in the new airline. However, this plan had

to be abandoned because of US laws preventing a foreigner to control a US based carrier. Founder David Neeleman then proposed the name Taxi with a yellow-and-black livery but changed his mind after being told that taxis do not exactly project an image of safety and cleanliness to New Yorkers. EC

● The latest airline planned in South Africa will be known as **African Star Airways** and has already negotiated with **Singapore Airlines** for two of the latter's surplus **Boeing 747-300s**. Operations are planned to start in May with scheduled services linking Johannesburg with Munich and London. The company has apparently been allocated slots at Stansted for three weekly arrivals in the late evening on Tuesday, Friday and Sunday.

● A new Greek airline was due to start operations on 1 April. **Air Manos** will start initially flying domestic services but hopes to fly to UK destinations later. RB

● **E R Air** is the name of **Emilia Romagna Airlines**, a new third level carrier recently formed at Bologna. This new airline intend to start regular flights at the end of June with a couple of leased **ATR42** flying to currently unserved destinations such as Crotone, Taranto, Budapest, Nurnberg, Sarajevo and Corsica Island. The airline is also likely to operate charter flights. The first aircraft is expected in June and the second in September. EC

● **Italy First** plans to start regular charter flights on 19 April when the airline receives two **B767-300** on lease from **GECAS** fitted with 282 seats. The aircraft will be based at Milan Malpensa and Verona and will fly to Mexico, the Caribbean and Egypt. EC

BA/AA and Iberia

British Airways has confirmed that it will take a 9% holding in **Iberia** while **American Airlines** will take a 1% stake in the company as part of the airline's privatisation programme.

In addition, Iberia announced that it has accepted an invitation to join the oneworld group of airlines which will make one of the world's premiere airline alliances even stronger.

This agreement builds upon an agreement reached between the airlines last year, which already includes codesharing between Spain and the United States and reciprocal frequent flyer programmes. EC

Qantas eyes more aircraft

Qantas is planning further fleet and route expansion in the run-up to the Sydney Olympic Games next year.

According to inside sources the airline is close to buying two new **B747-400s** and two **B767-300ERs** direct from the manufacturer. Also on the shopping list are up to six mid-life **B747-300s**, either from **Cathay Pacific** or **Singapore Airlines**, so Qantas can retire four older B747s including two B747SPs.

Qantas already has three B747s and one B767-300 on firm order for delivery over the next two years. The airline will also reconsider a review of a new type of aircraft deferred 12 months ago. At the time, the **Boeing 777** and **Airbus A340** were considered the front-runners.

Chief executive James Strong said at the time that the **A340-500** was appealing because of its extremely long range. Also in the running is the **B767-400** as an inter-Asia replacement for the B747.

Also on the airline's agenda is route expansion, focused on New York and Bombay. Oneworld partner American Airlines is encouraging Qantas to return to New York and code-share across the North Atlantic to London. The airline can do this by linking up its Los Angeles and London services through New York and having a daily round-the-world flight.

The other route development is Bombay-London. Qantas has a Sydney-Singapore-Bombay service with a B767 but a B747-300 could fly the route and go on non-stop to London. This also opens an option for Qantas to expand the Perth-London service by flying to Bombay non-stop. EC

First Fedex MD-10

Boeing has rolled out the first **MD-10** freighter for **FedEx** at its Long Beach facility. **FedEx**, launch customer for the MD-10 conversion programme, currently operates a fleet of 26 MD-11s and is expecting three more in the next year. The MD-10 is the designation given to modified DC-10s that incorporate the **Boeing Advanced Common Flightdeck (ACF)**. Boeing

New shorts

● **Air Jamaica** will introduce an **Airbus A340** into service for UK routes from 2 June. The A340-300 will operate five times a week from London to Montego Bay and Kingston.

● Spanish commuter airline **Air Nostrum**, featured in a recent issue of *AI*, has ordered five new-generation **ATR 72-500s**. The first aircraft was expected in March, while the order will be completed by early 2000. EC

● **American Airlines'** new **Boeing 777** inaugurated services between Dallas and London Gatwick on 5 March. Earlier in the month, **Continental Airlines** launched daily Boeing 777 non-stop service between London/Gatwick and Houston. EC

● Leasing company **Ansett Worldwide Aviation** took the first of five **Boeing 737-700s** in late March, for onward lease to an Asian customer.

Emerald switch

Liverpool-based **Emerald Airlines** decided to end its involvement with scheduled passenger services on 26 March in order to concentrate on its freight commitments. The airline launched its only passenger service in April 1996, offering twice-daily flights between Liverpool and the Isle of Man with a pair of **HS748s** from its large fleet. Unfortunately, the carrier suffered poor loads in the face of keen competition from **Manx** which has always been fully committed to the route. The latter now intends to increase the frequency of services to the island to eight per day, at the same time honouring bookings made with Emerald. It is expected that the two HS748s configured for passenger work will be converted for cargo duties.

Boeing overflowing B717 steps

The first **AirTran Boeing 717** made its initial flight from Long Beach Municipal Airport on 25 February. Painted in the distinctive AirTran colours and with a complete airline interior, the B717 will now join the flight test and certification programme. AirTran has ordered 50 of the 100-seat aircraft and holds options for 50 more.

The airline is scheduled to receive its first B717 at the end of this summer and seven others by the end of the year. AirTran will receive 12 aircraft in 2000, 12 in 2001 and 18 in 2002. The AirTran 717 will accommodate 117 passengers in a mixed-class configuration — 12 seats in first class and 105 seats in economy class.

The AirTran aircraft will be used in the Boeing flight test programme to evaluate the B717's functions and reliability in simulated airline operations. The plane joins three other B717s that are making good progress toward regulatory agency certification this summer. To date, the test aircraft combined have recorded 712 flights and 756 flight hours. EC

B767-400ER assembly

Boeing has begun building its newest twin-aisle aircraft in its Everett factory in Washington state. Workers loaded the **Boeing 767-400ER** front left-wing spar into an automated tool to start assembling the aircraft wing in early February.

At 201 feet, 4 inches, the B767-400ER is the second B767 derivative to be 'stretched.' The first was the 180-foot B767-300, which is 21 feet longer than the original B767-200. The newest version will carry about 15% more passengers than the -300, accommodating 245 seats in a three-class configuration and 304 in a two-class layout. This compares with 218 and 269 seats in the B767-300, respectively.

The first B767-400ER is scheduled to roll out of the factory this summer, begin a flight-test programme in October and deliver to **Delta Air Lines** in May 2000. EC

B737-900 design

Boeing has reached firm design configuration of the **Boeing 737-900**, a key milestone in the development of the longest Next-Generation 737 model.

Measuring 138 feet 2 inches in length, the B737-900 model surpasses the B737-800 by nearly nine feet. The increased size will accommodate about 18% more cargo volume and about 9% more passenger cabin area than the B737-800. Boeing says that the B737-900 will provide the lowest dual-class seat-mile costs available in a single-aisle aircraft, rivalled only by the **Boeing 757**.

The aircraft is scheduled for its initial flight in August 2000, followed by first delivery in April 2001. To date, 40 of the new 737-900 models have been ordered by four carriers — **Continental Airlines**, **KLM**, **Korean Airlines** and launch customer, **Alaska Airlines**. EC

● The first **Boeing Business Jet** fitted with winglets flew for the first time from Boeing Field, Seattle on 23 February. Although this is the first BBJ to be flown with winglets, which are designed to increase the aircraft's range, Boeing used a **B737-800** as a testbed for BBJ winglets last summer. Once the winglets are certified, they will be offered as a post-delivery installation feature on all BBJs. EC

● **Boeing** is now building **Next-Generation 737s** at the increased rate of 24 aircraft per month which it claims is the highest ever for a single commercial aircraft model.

scheduled for March and April 2000. EC

● **Spanair** has selected the **Airbus A320** family for its fleet update programme. The carrier placed a firm order for 21 aircraft, reconfirmable orders for a further 12 and options on an additional 12, all of which will be powered by **IAE V2500** engines. Deliveries begin in September 2000 and could extend to the end of 2005.

● Romanian carrier **Tarom** took delivery of four additional new **ATR 42-500s** on 12 March. The aircraft are part of the nine aircraft deal signed in 1997 and join two **ATR 42-300s** and two **ATR 42-500s** already operated by Tarom on a domestic and regional network. Deliveries of the remaining aircraft on order are scheduled for the end of 1999 and in the first half of 2000.

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Identity parade

Above: This Boeing 757 N651LF arrived at Manchester in mid-March on delivery to Flying Colours, wearing Transaero colours with Royal Nepal titles. Mark J. Brocklehurst

Right: World Airways MD-11 N272WA at Manchester in early March. Still wearing a basic Aer Lingus scheme from its previous lease, the aircraft was returned to World before being leased to Saudia Arabian Airlines for the Hadj charter season. Denis Norman



New colours

Above: El Al Israel Airlines, the flag carrier for Israel, took delivery of its first Boeing Next-Generation 737-800 in late February in this new colour scheme. The carrier has two additional B737-800s and two B737-700s on order with Boeing. Boeing

Right: Flemish airline VLM has revealed a branding change which will see its fleet adopt this attractive white, blue and gold scheme. The first aircraft to have been painted is Fokker 50 OO-VLR, which flew London City-Antwerp on 8 March. The remaining six aircraft are to be completed by the end of June. VLM



American anniversary

American Airlines Boeing 757-200 N679AN pictured at Chicago wearing the airline's 1959 livery worn to commemorate 40 years of the company's jet operations. Alan Lord



New for Alitalia

Alitalia took delivery of the first of 19 firmly ordered Airbus A320 single-aisle aircraft in Toulouse on 11 March. The aircraft joins a 22-strong A321 fleet on the domestic, European and Mediterranean routes of the Rome-based carrier. Seating between 131 and 147 passengers, Alitalia's A320 is powered by CFM56-5 engines.

Meanwhile, Alitalia announced an order for three ATR 72-500s. These new-generation ATRs will be operated by Alitalia Express — the regional carrier of the Alitalia group. Deliveries of the aircraft will start in July and all three aircraft delivered by the end of 1999.

Indian recommendations

The Indian parliament's standing committee on transport and tourism has recommended that Air India and Indian Airlines be merged into a single entity and that the two carriers jointly operate their fleet 'to avoid duplication.'

Air India is the country's international carrier and Indian Airlines is primarily a domestic carrier but competes with Air India on some routes to the Middle East and South East Asia.

The committee, which was asked to examine the future of Air India, said the airline needed new aircraft but lacked the fund to acquire them. A merger between the two carriers will result in cost savings that would allow the new airline to purchase aircraft to replace and expand its fleet.

In December 1998, the board of directors of the two carriers began moves to merge the two airlines by deciding to revert control of the state-owned carriers to a single holding company.

However, the move was interrupted by the Indian government which complained it had not been consulted even though it was the largest shareholder of the two carriers. EC

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Vol 3 - New York JFK (L) A320, Quito (L) A340, Frankfurt (T) B 777, Caracas (L) B 747-200, Bogota (T) A340, Bogota (L) B747-200. (80 mins) Order No. V266

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Vol 5 - Hanover (T), Punta Cana (L), Punta Cana (T), Puerto Plata (L), Puerto Plata (T), Dusseldorf (L) A310-300. (89 mins) Order No. V268

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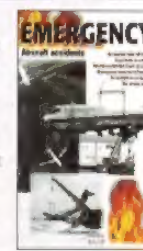
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Emergency

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Rare bits

Top: Registered in Equatorial Guinea, this Let 410 3C-KKD (ex-Aeroflot c/n 841319) arrived at Glasgow in early March as a diversion from Prestwick. It was on delivery to a customer in Texas, arriving from Budapest via Maastricht and departing for Iceland the next day. *Iain Mackenzie*

Above: Little is known about the small Asian state of Bhutan near Nepal, but visits by aircraft of its domestic airline Royal Bhutan can be witnessed on occasion at BAe Woodford where they are maintained. Shown here is BAe 146-100 A5-RGD (E1095) during a recent visit. *Ian Doyle*

KLM extras

KLM Royal Dutch Airlines will be expanding fleet capacity to meet the increase in demand expected on its intercontinental route network. The airline also intends to upgrade its European fleet.

In an announcement in late February, the airline said it has placed orders for four new **Boeing 747-400 Combi** aircraft for operation on major intercontinental routes. Delivery of the first two aircraft is scheduled for 2000 and 2001. Under current planning, Boeing will deliver the third and fourth aircraft in 2004 and 2005.

In addition to the extra capacity for its major intercontinental routes, KLM will lease a twelfth **B767-300ER** aircraft from International Lease Finance Corp (ILFC), for operation on KLM's thinner intercontinental routes and on major European routes.

To better serve customers on its European route network, KLM has also ordered five **Next-Generation B737-800** aircraft, configured for 158 seats, for delivery in 2000. These will replace five of the Boeing 737-400s in KLM's current European fleet. *ec*

Guyana Airways for sale

Several US, European and Caribbean firms are bidding to buy a majority share of once-profitable **Guyana Airways**. Unable to come up with the necessary funds the Guyana government has decided to sell a 51% stake in the carrier.

However, interest in Guyana Airways is sure to be dampened by the decision of Canadian and US authorities to withdraw the flight operation license of the airline's lone **Boeing 757** aircraft, which it used on flights to North America.

Stretched out

Boeing delivered the first two **B757-300s**, its newest commercial jetliners, to **Condor Flugdienst**, the largest holiday charter airline in Germany, on 13 March.

Boeing launched the B757-300, a derivative of the B757-200, in 1996 with an order for 12 aircraft from Condor. The charter carrier subsequently ordered a 13th B757-300 and is scheduled to take delivery of seven of the aircraft in the first half of 1999.

The first two arrived in time for the busy Easter period and a Condor spokesman said the aircraft would go into revenue service immediately, joining the 18 **Boeing 757-200s** and nine **B767s** in Condor's fleet.

The carrier plans to use the B757-300 this year to fly holiday makers from 13 German cities to destinations in Greece, Turkey, Spain, Egypt, Cyprus, Tunisia, Morocco, the Balearic and Canary Islands.

CRJ-700 final phase

The first 70-seat **Canadair Regional Jet (CRJ)** has entered the final phase of assembly. The **CRJ Series 700**, launched in January 1997 had recorded 96 firm orders by the end of 1998 from such airlines as **American Eagle**, **Atlantic Southeast Airlines**, **COMAIR**, **Lufthansa** and **Horizon Air**.

Roll-out and maiden flight of the new-generation twinjet is scheduled for May, with certification and initial customer deliveries to follow in the first quarter of 2001.

Bombardier Aerospace is also evaluating a new twinjet, the **BRJ-X**, in the 90- to 110-seat class. A formal programme launch late in 1999 would lead to certification and first delivery in 2003. An Airline Advisory Council, comprised of 14 airlines from seven countries which held its first meeting in Montreal in November 1998, is providing input on the aircraft's design, configuration and performance. *ec*

The aircraft, leased from **ILFC**, has reportedly not been repaired despite the discovery of cracks on its landing gear in 1998. Guyana Airways has announced it will try and lease another aircraft to operate its flights to New York and Toronto during Guyana's peak Carnival season. *ec*

Poor Britannia

Britannia Airways has blamed hurricanes, strikes and air traffic delays for its poor performance in the latest league of air charter delays. The chart, compiled by the Air Transport Users Council showed that Thomson-owned Britannia slumped from fourth to 13th in the league table with the number of flights more than 60 minutes doubling from 10 to 20%.

Significant improvements by some British airlines included **Air 2000** and **Airworld** (now part of **Flying Colours**). **Flying Colours** came top of the list with delays averaging just eight minutes. *RB*

In brief

● Peru's only international carrier, **Aeroperu**, suspended operations on 9 March. The suspension is a direct result of the airline's primary owners, Mexico's **Cintra Group** and **Delta Air Lines**, pulling the plug on further investment into the ailing carrier. Reports suggested the shut down is temporary although most of their aircraft have returned to lessors.

● With effect from October, **Alitalia** is to change its two letter code to 'WE'. Meanwhile, the carrier has dropped the route Pisa-London Stansted route due to poor load factor and switch the service instead to London Gatwick from 28 March. *ec*

● **Ariana Afghan** wants to buy a **B747-200** from **Kuwait Airways** (9K-ADD, s/n 22740) in order to fly to Europe. The Kuwaiti airline has been trying to sell the aircraft for a while as it has a 'glass' cockpit and is non-standard to other aircraft in the fleet. *ec*

● **British Airways** is returning to the Nice route, albeit via **CityFlyer Express**. A daily service will commence on 12 July on this highly competitive route which BA withdrew from in 1996. *RB*

● The BA franchise service flown by a **Brymon Airways Dash 8** between Newcastle and Paris Charles de Gaulle was dropped at the end of March.

● Scheduled seaplane service by **Chalk's International Airline** resumed as of late February courtesy of **Gulfstream International Airlines**. Gulfstream has been requested by the US Bankruptcy Court of Dallas, Texas to operate Chalk's while it reorganises under the protection of the bankruptcy laws. *ec*



Oman at MAN

A rare sight at Manchester recently was **Oman Air A320 A40-MA**, which arrived from Dubai on 17 February for attention from **FLS Aerospace**. The aircraft will be repainted into **Airtours** livery, and is destined to operate for **Airtours'** new German subsidiary **Fly FTI** during the summer. *Terry Shone*

● Irish independent **CityJet** is increasing capacity on the London-City-Dublin route to seven flights each weekday. Meanwhile the airline is placing another **BAe 146** with **Air France** to operate the latter's Paris-Florence service. **CityJet's** board has rejected an offer of \$3.7 million from **National Jet Systems** to purchase 60% of the Irish airline. **NJS** had planned to drop several of the routes operated by **CityJet**, including the Dublin-London City and Dublin-East Midlands routes, leading to the layoff of at least 100 of the airline's 350 staff. *RB/ec*

● **Continental Airlines** retired its last **Boeing 747** and **B737-200** in March as it moves closer to having the youngest domestic jet fleet in the US airline industry. In 1999, Continental is retiring 57 aircraft — nearly one retired aircraft for every new aircraft added to the fleet. The retirements and new aircraft deliveries will reduce Continental's average fleet age to just 7.6 years by the end of this year. *ec*

● **Debonair** has received the last former **Air Atlantic BAe 146-200** (E2012 C-FHAV), which departed St John's on 6 February to become **G-DEBK**. Meanwhile the airline has been repainting several aircraft all-white with a blue tail in anticipation of the beginning of a contract to operate flights on behalf of **Lufthansa Cityline** due to begin in March. *ec*

● **easyJet** is adding a second daily Luton-Aberdeen service from the start of the summer schedule and dropping an early morning Edinburgh service. Extra capacity at weekends to Nice and Barcelona are the only major changes from its Luton base, but Liverpool gets a daily Malaga service from 15 July with **Belfast International** being served three times daily from the same date. *RB*

● **GB Airways** is increasing capacity on its services to Faro from both Heathrow and Gatwick. The airline's B737-300s will be replaced by B737-400s, giving a 20% rise in capacity from Heathrow and 11% from Gatwick. Heathrow will be served six times weekly with 10 flights a week from Gatwick. *RB*

Low cost airline **go** has announced four new routes with two competing directly with charter airlines. A four times weekly service to Malaga commenced at the end of March, with Faro commencing at the same time and Bilbao and Madrid starting later in the summer. The airline's Lisbon service is to go double daily from the start of the summer timetable. See feature in this issue. *RB*

Casualties

● The **Aeroparque Jorge Newbery** at Buenos Aires, Argentina, was the scene of a fire which involved **MD-88 LV-VBY** while undergoing maintenance on 24 February. Operated by **Aerolineas Argentinas**, the aircraft is reported to be beyond economic repair.

● **China Southwest Airlines** lost a **Tu-154M** (B-2622) on 24 February when the aircraft crashed while preparing to land at Wenzhou, China, with a scheduled flight from Chengdu. After receiving clearance for a routine descent there was no further contact with the machine which crashed in farmland about 18 miles short of its destination. There were no survivors amongst the 50 passengers and 11 crew members involved in an accident that occurred in good weather during daylight hours. Two farm workers in the vicinity received severe injuries when struck by falling debris.

● Following a routine scheduled flight from Cagliari, Sardinia, to Genoa, Italy, on 25 February, **Fairchild Dornier Do328 D-CPRR** failed to stop before running off the end of Runway 11 into the sea. Three passengers and one cabin attendant were subsequently drowned in the submerged fuselage, while a further 11 of the 31 occupants received injuries. Operated by **Minerva Airlines** under a code-share arrangement with **Alitalia**, the aircraft is reported to have experienced braking problems on the airport's relatively short runway, although the airline believes that strong cross winds were responsible. The accident occurred at midday in otherwise good weather conditions.

● Strong crosswinds encountered by **Boeing 737-228 F-GBYA** when landing at Biarritz, France, on 4 March were responsible for the aircraft running off

the side of the runway during its landing. Although there was substantial damage to the aircraft, fortunately there were no casualties amongst the occupants.

● **Brymon's Dash 8 G-BRYP** had difficulty landing at Plymouth after arriving with a scheduled flight from Bristol on 28 February. A heavy touch-down caused damage to the port undercarriage, wingtip and propeller, followed by the collapse of the left leg. This resulted in the aircraft sliding some 300m along the ground before coming to a halt. None of the nine passengers and four crew members were injured.

● A **Lockheed Electra (N285F)** operated on a wet-lease by **Channel Express** was damaged at Shannon on 1 March. It is reported that it made an approach with undercarriage retracted causing the propellers to strike the ground. Fortunately the aircraft was able to remain airborne to complete another circuit for a safe landing.

● An **Air France Cargo Boeing 747-2B3F (F-GPAN)** was destroyed by fire at Madras-Chennai Airport, India, on 6 March. After a normal touch-down, the machine travelled some 7,000ft along the runway before the nose-wheel leg collapsed. As a result of this the aircraft overran, at the same time bursting into flames. All five crew members escaped the blaze, although one suffered multiple fractures when jumping to the ground.

● **Iberworld's A320 EC-GZD** ran off the taxiway at Groningen/Eelde in the Netherlands on 12 March causing its left undercarriage to sink into the ground until resting on the engine. There were no casualties amongst the 180 passengers and six crew while the aircraft was returned to more substantial ground on the following day

AIR POWER

An Airpower special report on the first news and images from the Kosovo conflict

Kosovo crisis



After months of negotiations, the patience of NATO leaders finally snapped on the 23 March when it was announced that air strikes would be launched against Serbian military targets in Kosovo and Yugoslavia.

Designated **Operation 'Allied Force'**, the first aggressive NATO military action in the organisation's 50 year history commenced the following day with an opening salvo of 100 cruise missiles launched from ships, submarines and B-52H bombers.

'All efforts to achieve a negotiated political solution to the Kosovo crisis having failed, no alternative is open but to take military action,' NATO secretary-general Javier Solana said on the eve of the attacks. 'We must halt the violence and bring an end to the humanitarian catastrophe now unfolding in Kosovo.'

All eight of the 2nd Bomb Wing B-52H Stratofortresses which had been based at RAF Fairford since 21 February participated in the first wave, which also heralded the combat debut of the B-2A Spirit — two of which dropped JDAM bombs on high-priority targets. Commenting on the B-2's operation, US defense secretary William Cohen reported that it had performed to its capabilities. 'It's a stealthy aircraft

that can fly in all weather with considerable ordnance aboard. We are satisfied that it was able to conduct itself and carry out its mission accordingly,' he reported.

The second wave of strikes were launched from air bases in Italy and from the **USS Enterprise** in the Adriatic. British participation comprised eight **No 1 Squadron Harrier GR7s** based at Gioia del Colle plus **No 216 Squadron TriStars** at Ancona and **Sentry AEW1s** from Aviano. Being the main focal point of NATO operations concerning the Balkans, Aviano also hosted the core of NATO's strike assets comprising: **US forces O/A-10s** (52ndFW); **F-15Es** (48thFW); **F-16Cs** (31stFW, 52ndFW); **F-117As** (49thFW); **EC-130E/Hs** (355thWg); **EA-6Bs** (VAQ-134, VMAQ-2); with **EF-18As** (Spanish AF/Ala-12); **CF-18As** (Canadian Forces/Nos 425 and 433 Sqn); and **Portuguese AF/201 Esq F-16As**. Elsewhere, **Belgian AF** and **Dutch AF F-16As** flew from Amendola, **Turkish AF F-16Cs** from Ghedi, **French AF Mirage 2000C/Ds** from Istrana and **German AF Tornados** from Piacenza whilst **Italian AF** aircraft also participated.

The first Serbian aircraft casualties were five MiG-29s, three of which were downed over Yugoslavia on 24 March by two USAF F-15Cs and a Dutch F-16 (J-063 from No 322 Sqn), while another pair of F-15Cs claimed two victories over Bosnia on 26 March. The Serbs responded by claiming NATO losses, including one in the Cicavica Mountains northwest of Pristina in Kosovo during a raid on 24 March. This particular claim was strongly denied by the allies but firmly maintained by the Serbs, who also claimed to have shot down three missiles on the same date. However, the allies did lose a highly-prized asset on 27 March, when an F-117A came down near Belgrade (see *Aimews*).

The allied attacks focused on degrading air defence systems in order to reduce the risk and the



threat to the allied pilots in subsequent operations. The target list, which numbered 40 in the first attacks, consisted of command and control systems and the military forces that were being used to suppress Kosovar Albanians. 'We are attacking the military infrastructure president Slobodan Milosevic and his forces are using to repress and kill innocent people,' Cohen said, adding that 'NATO forces are not attacking the people of Yugoslavia. They are attacking the military forces that are responsible for the killing and carnage in Kosovo.'

As well as the aerial threat, allied pilots had to contend with Yugoslavia's 'fairly substantial' air defence system, built primarily with Soviet era equipment, and one which NATO officials take very seriously. The Serbs have **SA-6** mobile missiles, **SA-3** missiles (which can be moved but are more cumbersome), about 2,000 mobile anti-aircraft guns and a range of shoulder-fired missiles for lower altitude aircraft.

Serbia also has a relatively limited air force of about 60 to 80

fighter aircraft. A Pentagon spokesman said that 'Yugoslav air defense forces are well-trained, and well-equipped, although their equipment is somewhat older, and because Yugoslavia has been under economic sanctions for some time, it may not have been as well maintained as they would like.'

Compared to Iraq, where US and coalition pilots have dealt with air defences almost daily since late December, Yugoslavia's terrain presents a different challenge. It's easier to hide air defence assets, but it is also harder to relocate and redeploy air defence assets.

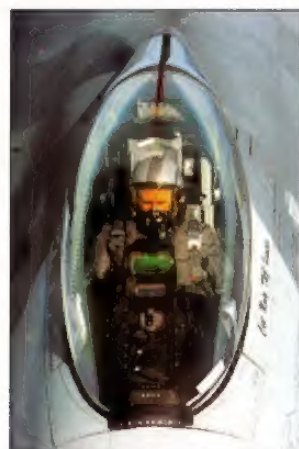


As *AI* went to press, NATO geared up for low-level attacks on military ground targets having suppressed the country's air defence infrastructure. However, amid NATO's adamant stance on the situation, Russia's position was also made crystal clear. President Boris Yeltsin made the disturbing statement that Russia reserved the right 'to take adequate measures including military ones to ensure the security of Europe.' Furthermore, the Russian defence ministry said that it reserves

the right 'to render military assistance to Yugoslavia as a UN member state that has fallen victim to aggression,' and Russia's UN ambassador demanded that NATO end its 'illegal military action.'

Consequent actions have sent chills down the spine of the western world — Russia has severed its links with NATO, declared the SALT II Treaty forever dead, and announced its desire to deploy nuclear weapons on Belarus territory. Even Ukraine called for nuclear rearmament, while China expressed its disapproval of NATO's move in the strongest tone. These developments will hopefully come to no more than a 'war of words', but as several of these sobering statements have warned, these could clear an unintended path towards a new Cold War.

More details on the campaign will be carried next month. **DYLAN EKLUND/RC**



RAF heavies

Significant progress has been made over the past few weeks with all three of the UK's new transport aircraft programmes. As the most urgent of these, the **Short-Term Strategic Airlift** (STSA) requirement for a four, seven, or nine-year lease of four 'C-17 equivalent' transports attracted several bids by the late January deadline. Of these, the joint submission on 29 January by **Boeing** and **British Aerospace** of the **C-17** itself is claimed by its proponents as the only one meeting all the STSA requirements, and will obviously provide the benchmark against which the other contenders will be assessed.

Among these, **Airbus Transport International** is offering either the **A300F** cargo version or **A300-600 Beluga** double-decked super-freighter, while there are two proposals for the **Antonov An-124**. One is from the Jersey-based leasing company **IBP Aircraft**, and the other is from **Antonov** and **Air Foyle** jointly proposing an

extensively modified An-124-210 version with Rolls-Royce RB211-524HT turbofans and Western avionics. Bids have also been reported from **Rolls-Royce**, although with no further details, and from **Ilyushin** with the Pratt & Whitney-powered **Il-76T**, using Rockwell Collins avionics.

Boeing is also proposing the C-17 for the RAF's second-tranche C-130K replacement **Future Transport Aircraft** (FTA) programme, involving up to 45 aircraft, for which proposals were submitted on 1 February, plus similar RFPs also invited for competitive evaluation by Belgium, France and Spain. All four countries are participants in the **European Future Large Aircraft** (FLA), which is still the main FTA contender, although now facing competing bids. Following formal incorporation of the **Airbus Military Company** on 29 January, the FLA has been redesignated the **Airbus A400M**, for which CASA in Spain — currently the subject of a BAE take-over bid — has been nominated as final assembly contractor, for initial deliveries from late 2005.

Three Ukrainian Tu-160 'Blackjacks' may well soon be on their way to the US for conversion into satellite launch vehicles!



US 'Blackjacks'?

According to a leading US defence journal, reporting in February (not 1 April), the Government of the **Ukraine** has authorised the sale of three **Tupolev Tu-160 'Blackjack'** variable-geometry supersonic bombers, plus spare parts, to Platforms International Corporation in the USA. The three Tu-160s will be used as the most powerful and cost-effective reusable satellite launch vehicles on the market today, as well as the asset base that will secure the financing required to fund the 'HAAL-2000' programme. The American company is believed to have finalised a strategic partnership agreement with the Russian Commonwealth Aerospace Technology Consortium (RTACT).

The Tu-160 is the heaviest and most powerful combat aircraft of all time and was produced solely to counter the Rockwell B-1 Lancer. Its NK-321 afterburning turbofans produced 79% more installed engine power than the B-1, and though bigger, has lower aerodynamic drag. The first flight of the Tu-160 was at Zukovsky on 19 December 1981.

The 'Blackjack' became operational with the Strategic Aviation 184th Regiment at Priluki, Ukraine in October 1987. Production was halted after about the 38th aircraft in 1992, although 100 were originally planned. Ukraine laid claim to Russia for the 20 aircraft (two squadrons of 10) resident there. The remaining airworthy 'Blackjacks' in Ukraine are likely to be grounded, and de-militarised under the Defence Agreements, by the end of this year.

A decision on the choice of 9,500shp turboprops for the Mach 0.72 A400M, between the BMW Rolls-Royce BR710; M138 development of the M88-2 from the SNECMA, Fiat, ITP, and MTU consortium; and the Pratt & Whitney Canada PW150 Twin Pack, was expected within the next few weeks. Requirements for some 288 aircraft are still estimated by the seven European countries in the original FLA group. Bids are

also being made by **Lockheed Martin** with the C-130J, **Boeing's** futuristic **Super Frog** tailless tilt-wing advanced tactical transport, and the **Russian-Ukraine Medium Transport Aircraft** consortium led by the Rosvoorouzhnyye arms export agency and Antonov, with German government support for an **An-7X** version of the An-70. This might use Western turboprops in place of the current D-27 proplans, and

No SAM from Saddam

Hostile action by the **Iraqi air defence system** against coalition aircraft patrolling the northern and southern no-fly zones, was apparently suspended at the end of February. Between the end of **Operation 'Desert Fox'** in mid-December, and 1 March, coalition aircraft expended more than 200 air-to-surface missiles and laser-guided bombs (LGBs) on Iraqi AAA, SAM, ground-radar and control sites, without loss. Over 20% of Saddam Hussein's SAM capabilities have reportedly been destroyed.

In the northern zone, US European Command reported that by late February US aircraft operating from Turkish air bases dropped five 2,000lb GBU-10 and 74 611lb GBU-12B Paveway II LGBs, plus 19 Raytheon Systems/Texas Instruments AGM-88 high-speed anti-radar missiles (HARMs) with 140lb blast fragmentation warheads. Also 'delivered' were 10 3,000lb Boeing Autonetics & Missile Div AGM-130/GBU-15 glide-bombs with 2,000lb Mk84 HE or BLU-109/B penetrator warheads.

According to US Central Command, an even wider variety of over 100 missiles and bombs was launched in 3,500 sorties by coalition aircraft over the southern no fly-zone in the same period. In addition to GBU-10s, GBU-12s, AGM-88s and AGM-130s, these included 675lb IIR-guided Hughes AGM-65G Mavericks, B-52-launched 3,150lb Boeing AGM-86C Conventional Air-Launched Cruise Missiles (CALCMs), with 2,000lb HE/steel-ball shrapnel warheads, and the operational debut from F-15Es on 25 January of the first three Raytheon/Texas Instruments AGM-154A Joint Stand-off Weapon (JSOW), with 145 BLU-97/B Combined Effect Bomblet sub-munition warheads.

NATO welcomes Eastern Bloc!

The North Atlantic Treaty Organisation (NATO), accepted the **Czech Republic, Hungary and Poland** as its newest members on 12 March during ceremonies at the Truman Presidential Library in Independence, Mo. The site chosen for the event highlighted President Truman's contribution to the creation of the security alliance following WW2. Speaking at the historic event, US Secretary of State Madeleine Albright said Poland, Hungary and the Czech Republic are the first new members since the Cold War's end, but not the last. 'NATO enlargement is not an event, it is a process,' she said. 'Over time, NATO will do for Eastern Europe what it has done for the West.' Interesting!

would need completely new NATO-compliant avionics.

A decision on the FTA requirement, which may involve acquiring more than one type, is expected early next year, when selection of the FLA would be necessary for its programme launch.

Replacements for the RAF's 24 **BAe VC10** and nine **Lockheed TriStar** tanker/transports from about 2004-07 are also being sought by the RAF through its **Future Strategic Tanker Aircraft** (FSTA) programme, for which requests for information (RFIs) were issued on 3 February. Lease operation is also planned for these aircraft, through a Private Finance Initiative, which would involve contracts to provide the UK with specific annual tanker/transport air and ground support services from a commercial operator, using RAF-registered aircraft and military aircrew.

Strong interest in the FSTA programme has already been expressed by more than 50 international companies, including **Airbus**, with its A310-based multi-role tanker/transport (MRTT), and **Boeing**, with the B757 or B767, while **Omega Air** in Dublin is proposing a range of options involving various long-range commercial transport aircraft conversions. Liaison has also been reported with the **Royal Australian Air Force**, for its similar Project Air 5402 requirement to replace three Boeing 707-338C tankers, with decisions expected from about 2002.

ASTOR decision imminent

The three competing consortia for the MoD's £750 million **Airborne Stand-Off Radar** (ASTOR) programme, made their final briefings to the House of Commons Defence Committee on 1 March. This marked the closing stages of this long-standing battlefield surveillance requirement, with a possible decision being predicted before the scheduled NATO summit meeting on 24 April. The latter is expected to include discussions on NATO's parallel Airborne Ground Surveillance (AGS) requirement, on which the UK ASTOR choice is likely to have considerable influence towards evolution of a possible joint European programme.

Recommendations from the MoD's Equipment Approval Committee to the Cabinet, scheduled for early February, were unexpectedly delayed by Defence Ministry and Commons Defence Committee requests for further clarification of some aspects of all the competing bids. These were believed to relate particularly to costs and whether four or five **Gulfstream GV** or **Challenger** platforms were considered necessary by each contender to complete the required tasks.

Northrop Grumman, with its proposals for British participation in developing and producing its

Eastern Apaches

Singapore has agreed to purchase eight multi-mission **AH-64D Apache** helicopters from Boeing, through a foreign military sales contract with the US Army. The \$620 million FMS arms package also includes options on 12 more, plus 216 Boeing/Rockwell AGM-114K Hellfire 2 laser-guided ATMs, Hydra 70 unguided rockets, other weapons and associated equipment. This will reportedly include the AH-64D's Lockheed Martin/Northrop Grumman AN/APG-78 Longbow millimetric mast-mounted radar, in its first release to a Pacific Rim country. The possibility has also been mentioned of installing Rolls-Royce/Turbomeca RTM322 turboshafts, as in the UK's WAH-64s, in RepSAF Apaches, to improve their hot and high performance. Singapore is the fourth AH-64D customer, following the US Army with orders for 232, Kuwait with 16, the Netherlands with 30 and the UK with 67, and is expected to receive its first Apaches from 2002.

Global Power hour!

The enthusiast 'grapevine' went into overdrive during the few days preceding the visit of a most welcome aircraft to the UK shores.

On 10 March, B-2A Spirit 82-1067/WM named *Spirit of Arizona* touched down at RAF Fairford as part of a 'Global Power' mission. The aircraft had departed its base at Whiteman AFB, Mi, at approximately 17.00hrs (Missouri time) arriving at Fairford just before 10.00hrs UK time. After only a one-hour stop, enabling a re-supply and a crew change, the aircraft continued on its sortie that would inevitably see the aircraft arrive back at Whiteman after 'hitting a few ranges in States'.

This particular aircraft, the second B-2A AV-2, was named *Spirit of Arizona* in a ceremony held at Davis Monthan AFB on the 20 March 1998 and subsequently issued to the 509th BW where it currently operates.

This was the first solely 'operational' visit to the UK of the type although the B-2A has been seen at three British air displays on 'Global Power' missions since 1996.

RAF Fairford is the designated 'Global Power' airfield in Europe, one of only three outside the United States. It is anticipated that this visit was to be the first of a series to Fairford over the coming years.

Let us hope that we can report in advance on the next operational visit in time for *AI* readers to see this magnificent aircraft.

MORLEY LESTER

Stealthy approach

Various angles on B-2A 'Spirit' 82-1067/WM *Spirit of Arizona* during its recent visit to RAF Fairford as part of a 'Global Power' mission. Morley Lester



new active electronically-scanned phased-array (AESA) multi-mode radar, was brought into the final stages of ASTOR evaluations, despite earlier MoD risk-reduction contracts awarded only to the competing **Lockheed Martin** and **Raytheon** groups. Flight-tests of a Northrop Grumman ES3 prototype AESA radar started on 17 December last year in the nose of a BAC One Eleven test-bed, although initial trials appear to involve detection of airborne targets.

BAe and Computing Devices share joint UK project design authority in Northrop Grumman's Wizard consortium. Meanwhile, Lockheed Martin UK Government Systems' TeamASTOR with Marshall Aerospace, Marconi, Logica and others, claims that a decision in favour of Racal's active array

radar (specifically developed for this programme) is crucial in maintaining UK capabilities in global airborne surveillance technology. Raytheon, in partnership with Bombardier's Shorts, Marconi Avionics, Thomson-CSF and others, is proposing the Hughes-developed U-2-derived upgraded Advanced Synthetic Aperture Radar System-2 (ASARS-2) to meet the stringent dual-mode SAR/moving target indicator radar requirements of the ASTOR specification. Five successful flight-tests recently concluded the first phase of ASARS-2 development.

No hint has been given of any particular MoD preference, and ASTOR selection was forecast to be the closest-fought contest of any of the recent UK military equipment programmes.



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Touch of Polish

Although the **Polish government** is expected to announce a lease or purchase deal for new NATO-compatible combat aircraft (following its March acceptance, with the Czech Republic and Hungary, into the Western alliance), it is also beginning a modest avionics upgrade of a dozen or more of its 99 air force Sukhoi Su-22M-4/UM-3 'Fitter K/G' single- and two-seat strike fighters. Agreement has been reported with AVPK Sukhoi, through Russia's Rosvoorouzhnyye state import/export agency, for design integration of new tactical navigation equipment, with GPS satellite inputs, and a NATO-compatible IFF, into the existing PrNK-54 digital nav/attack systems.

A suitable IFF is already being produced under Thomson-CSF license in Poland as the SC-10 Suprasi, and installation of the new equipment is planned by the year-end at the WZL2 Polish Air Force depot in Bydgoszcz. With the Komsomolsk-on-Amur Production Association (KnAAPO), VPK Sukhoi is offering more extensive systems and airframe upgrades to the operators of some 60 Su-22M-3s, 20 two-seat Su-22UM-3s and 320 Su-22M-4s in 10 mainly Third World countries outside the CIS.

Nimrod upgrade delayed

Delays of nearly two years in the planned service entry date of the RAF's upgraded **BAe Nimrod MRA4** maritime reconnaissance aircraft, as well as a small cost increase, were admitted to Parliament on 17 March by under secretary of state for defence John Speller. In a written answer to a

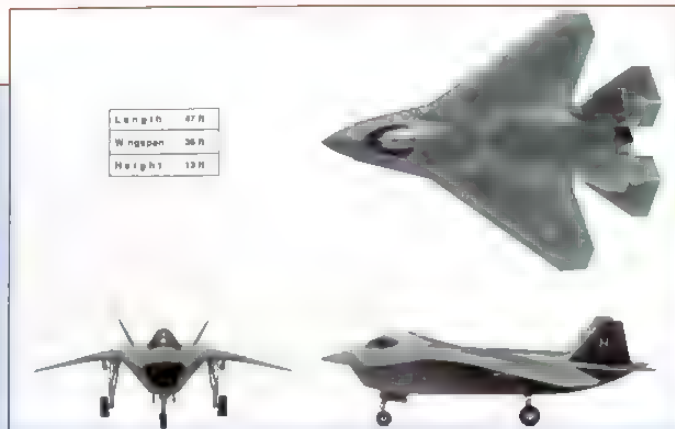
JSF problems

Recent US industry reports indicate that development costs and technical problems encountered by the two finalists in the **US Joint Strike Fighter (JSF)** programme, may prevent them being able to complete the concept demonstration phase within their \$750 million fixed-price contracts.

Boeing's X-32 and **Lockheed Martin's X-35** competing technology demonstrators are due to begin fly-off evaluations from mid-2000 onwards. One of each two-demonstrator prototypes was planned to be built in land- and carrier-based conventional take-off and landing (CTOL) configurations, as the X-32A and X-35A. The other was to be modified with its particular vertical lift systems as the X-32B and X-35B, to continue evaluation of their short take-off and vertical landing (STOVL) versions. Budget limitations, however, have resulted in Lockheed Martin opting for only a single JSF demonstrator prototype.

Final selection is planned in 2001 of the preferred contractor for the 2,800 or so JSFs costing over \$300 billion, and required for US Air Force (1,763), US Navy (300), US Marine Corps (642), and UK (possibly about 100) service from 2008. But proposals are being mooted for split procurement of both JSF types, to maintain fighter design and development capabilities in each of the two main US aerospace groups.

Extensive weight- and cost-saving revisions have recently been revealed by Boeing in its final JSF preferred weapon concept (PWSC) design configuration,



Three-view plan of the revised JSF proposal from Boeing; note the intake change from the previously forward raked 'jutting chin' profile, to a more conventional aft sweep. *Boeing*

No 373, compared with configuration 372, to which the concept demonstrators are being built. Main changes are in the 36ft span diamond-shaped CTOL wing planform to incorporate trailing-edge sweep, with overall area reduced from 620 to 570sq-ft, and the addition of horizontal stabilator tail surfaces on a 2ft longer fuselage to 47ft. More pitch control authority and redundancy will result, particularly for carrier operations, as well as for STOVL roles, with clipped 30ft span wings.

Some weight reductions are also sought from a change in profile of the canted vertical fins, cockpit canopy, and nose intake design. While maintaining the same low radar reflectivity sought for the rest of the JSF designs, the intake change from the previously forward raked 'jutting chin' profile, to a more conventional aft sweep, is claimed by Boeing to combine improved inlet efficiencies, particularly at high angles of attack, with lower forward-fuselage structure weights. Further slight refinements are planned by Boeing for its definitive JSF configuration No 377.

Parliamentary question, he said that when the contract to rebuild 21 Nimrods was placed with British Aerospace, as prime contractor, in December 1996, BAe undertook to meet an initial service date of April 2003. 'Resource and technical difficulties with the early phase of the programme at BAe', added the statement, 'mean that the company does not now expect the aircraft to enter RAF service before early 2005. The precise slippage is still the subject

of negotiations between MoD and BAe'.

Original estimates for the Nimrod rebuild programme were quoted at about £2 billion, but Speller's statement indicated current MRA4 procurement costs of £2.4 billion at September 1998 price levels, representing an increase of 0.5%. BAe's successful Nimrod bid was based on retaining a major part of the original airframes, but these now comprise more than 60% of new-build components. Under the terms of the fixed-price contract, BAe has agreed to the recovery by the MoD of liquidated damages, plus the imposition of further similar penalties in the event of additional delays.

As a major sub-contractor for the

Nimrod MRA4 programme, with a \$639 million contract from BAe to develop a new Tactical Command System (TCS). **Boeing** achieved a significant milestone ahead of schedule in January with completion of a Systems Integration Laboratory (SIL) and successful loading of the first operational software.

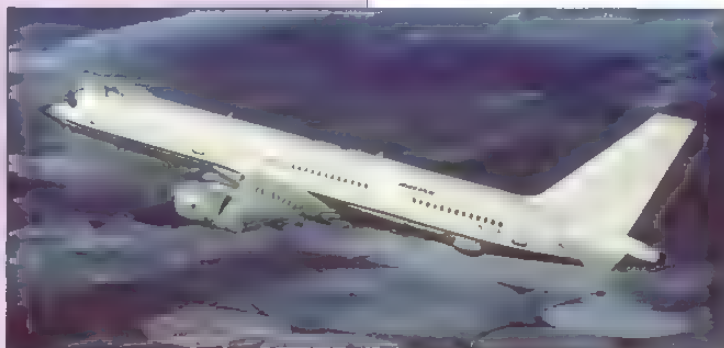
The SIL will test and qualify the MRA4's Boeing-developed major sensor systems, including new radar, electronic support measures, electro-optics, underwater acoustic detection and locating equipment, and magnetic anomaly detectors. Boeing's TCS also integrates the new Nimrod's communications, defensive aids and armament control sub-systems provided by other vendors.

SIL completion began a 15-month integration testing programme leading to formal qualification of the tactical command and sensor systems in mid-2000. First flight of the refurbished prototype Nimrod MRA4 was originally scheduled for the third quarter of 2000, followed by delivery of the first operational aircraft in 2001. Boeing is committed to supplying post-delivery support under the initial contract until 2008.

Designer headgear

Boeing has begun testing the F-22 Raptor's integrated avionics on board its Boeing 757 Flying Test Bed. The first avionics package, Block 1, which includes the radar and mission software, will be tested on the B757

between March and August 1999. Raptor 4004 will be the first aircraft to fly with the integrated avionics installed and is scheduled to take to the air in 2000. In the B757, the test avionics are operated from a simulated F-22 cockpit that has been installed in the test-bed cabin. Additional modifications to the test bed include installation of an F-22 forward fuselage section to the nose and installation of a sensor wing on the aircraft's crown. *Boeing*



Friend or Foe?

As exercises go, the All Service Combat Identification Evaluation Test 99 (or ASCIET 99), differed from many that the RAF participates in. Born out of a number of friendly fire incidents, the US-based exercise was designed to train both air and ground personnel in identification of friend or foe during the heat of battle. Although primarily a US-led exercise, the RAF was invited to attend in the shape of four ALARM-capable Tornado GR1s to undertake offensive support in the air interdiction (AI) and suppression of enemy air defences (SEAD) roles. The jets, drawn from the Bruggen Wing, were flown across the Atlantic by crews from No 31 Squadron. After participating in the early March exercise, the Tornados flew to CFB Goose Bay where they became part of the Exercise 'Western Vortex' detachment of nine aircraft for spring and summer low flying training. Pictured en-route to the 'States' is Tornado ZD810/DB of No 31 Squadron. *Peter R. Foster*



Backpacking down-under

Self proclaimed as 'one of the world's great air shows', the fourth biennial Australian International AirShow 99 attracted more than 450 exhibitors from 35 countries to Avalon, Victoria from the 16-21 February this year. One of the main topics of the show was Project Air 5077 ('Wedgetail'), the provision of an AEW&C capability for the RAAF, for which a final decision is expected during the middle of this year. All three contenders exhibited at the show, though Lockheed Martin's platform, the C-130J-30, was the only airframe in contention to be flown (top). Not to be outdone, Boeing has transformed one of its Business Jets into a full-scale mock-up of the B737 Airborne Early Warning and Control aircraft. The mock-up featured major mission components, including a 25ft replica of the MESA radar on top of the fuselage. Other components included the complete suite of operator consoles and equipment cabinets, the in-flight refuelling probe and an assortment of sensors (above). Another of the talking points of the show was the impending battle between Boeing and Airbus to compete to replace the RAAF's VIP Boeing 707. The latter aircraft was on show at Avalon sporting a smart new low-visibility grey colour scheme, which it received at RAAF Richmond last December. Likewise, the RAAF's tankers are also beginning to be thus adorned (left). *COWLEY AVIATION SERVICES*



One of the highlights of the Falcon Rejoin celebrations, was the re-enactment of the roll-out of the prototype YF-16. A test F-16 was specially painted up for the occasion. *Frank B. Mormillo*



One of the highlights of the Falcon Rejoin celebrations, was the re-enactment of the roll-out of the prototype YF-16. A test F-16 was specially painted up for the occasion. *Frank B. Mormillo*

Falcon Rejoin

Earlier this spring, 72 Lockheed Martin F-16 Fighting Falcons flocked from all across the United States to join up with 30 resident F-16s at Edwards AFB, Ca, for 'Falcon Rejoin', the 25th anniversary celebration of the jet fighter that has become America's primary multi-mission warplane.

'Falcon Rejoin' activities primarily centred around a display of the participating aircraft on the Edwards AFB ramp, with a mass fly-over by 25 Fighting Falcons having been intended to highlight the event. However, a low cloud ceiling on the day made it impractical to form up that many aircraft safely and a five-ship flyover, complete with a quintuple sonic boom had to suffice.

One of the highlights of the programme was a re-enactment of the YF-16 roll-out. Since the original YF-16 is now a museum piece, a Flight Test Center F-16B was painted up in the prototype's red, white and blue colour scheme for the re-enactment that was complete with special lighting, smoke and music. Among the aircraft displayed on the ramp were the two F-16XL prototypes which are still being used for test missions and a Northrop Grumman Corporation Rockwell Sabreliner that is fitted with a complete F-16 nose section for use as a radar test bed. *FRANK B. MORMILLO*

Equipment Update

Recent procurement by the **Bangladesh Defence Force Air Wing** has reportedly included new aircraft from both China and Russia. Delivery of four more **Guizhou GAIC FT-7B** two-seat combat trainers between 1997-2000 will double BDFAW complement of this type, to supplement 16 single-seat **Chengdu F-7MBs** received earlier for air defence roles. Fifteen uprated armed transport helicopters have also been delivered

from Russia's Kazan Helicopter Plant, to replace the BDFAW time-expired Mil Mi-8s

Delays of about a year are anticipated in the **Japanese Air Self-Defence Force** procurement programme for 50 upgraded **Fuji Heavy Industries T-7** turboprop trainers, following FHI's alleged involvement in a parliamentary corruption investigation regarding earlier military equipment orders. Initial funding of some 680 million yen (\$5.97 million) for the first two T-7s was withdrawn from the

AIR INTELLIGENCE

Advanced 'recce' by MORLEY LESTER on forthcoming military exercises and deployments

Apologies to those that have sent information regarding deployments via e-mail. We have not ignored them, it is just that the '@virgin.net' address is no longer available so in fact we have not received them. However, the new address is: damage.inc@morleylester.force9.co.uk

OPS BOARD

RAF KINLOSS

4-21 June 'JMC 99/2' Maritime Exercise. Overseas participation including P-3s and Atlantiques. (It may well be worth visiting RAF Leuchars and/or RAF Lossiemouth during this period).
September (Dates TBC) 'JMC 99/3' (As 'JMC 99/2'). Running in conjunction with Exercise 'Northern Lights' (See St Mawgan).
19-24 October 'Fincastle Trophy 99' Commonwealth maritime exercise involving 1x CF CP-140, 1x RNZAF P-3K, 1x RAAF P-3C plus, of course, RAF Nimrod. In keeping with the tradition of predicting military exercises, please note that Fincastle 99 has been moved to October rather than the previously anticipated June dates included in last month's section.

RAF LAKENHEATH

Although still awaiting official confirmation, it is believed that an F-16 unit, possibly the 510th FS from the 31st FW at Aviano AB will deploy here in mid April for approximately six weeks due to essential airfield works at the aforementioned station. (See also UK — Exercise 'Brilliant Foil').

RAF LEUCHARS

This year will see several deployments here by the Italian AF for operations on the Spadeadam Range. These will include:

12-23 April 4-6x Tornado IDS **17-21 May** 4-6x AMX
5-9 July 4-6x AMX

RAF LINTON ON OUSE

Course Graduation Days are planned for the following dates which

normally involve various fly overs from mainly RAF aircraft. 26 March, 30 April, 21 May, 2 July, *30 July (*See below), 3 September, 22 October and 3 December

The course that graduates on the 30 July will be of particular interest as the date coincides with the 80th Anniversary Event planned over the 30-31 of the month

An Enthusiast Photo Call has been arranged for Saturday 31 July, the theme of the Photo Call being 'Training Aircraft Past and Present' with a large foreign training aircraft contingent expected.

Tickets are priced at £10.00 each, with cheques being made payable to 'RAF Linton On Ouse Services Fund'. They are available now by sending your remittance along with an SAE to:

Fg Off Nick Gilroy, Photocall Co-ordinator, Air Traffic Control, Royal Air Force, Linton on Ouse, York, YO30 2AJ.

Overseas training aircraft are anticipated but we only have details of the expected French AF participation which, at present, consists of two/four TB-30 Epsilons and two French AF EMB312F Tucanos. The resident No 1 FTS will fly a figure '80' formation in the afternoon.

RAF LOSSIEMOUTH

Obviously the one not to miss will be the 'NATO Air Meet' which will be held here between 6-17 September. Fast jets from Belgium, France, Germany, Italy, The Netherlands, Norway, the USAFE plus of course the UK will be taking part. We will report in detail on this exciting exercise slightly nearer the date.

RAF ST MAWGAN

6-17 September Exercise 'Northern Lights' involving Hawks, Nimrods as well as Netherlands AF F-16s. The exercise will be running in conjunction with the 'NAM 99' at RAF Lossiemouth over this period.

18-22 October 'Air Combat Week' As with the event in 1998, many UK types will be involved in this insight into the 'British way' of air operations (See Also UK — Exercise 'Brilliant Foil')

RAF WADDINGTON

Unfortunately we begin with some details of cancellations for the ACMI range. First 'no shows' are the RAF Harriers and Jaguars which were due in April. The Swiss AF has downgraded its detachment in June to just four F/A-18s which has inevitably led to the cancellation of 899 NAS and its Sea Harriers which were expected to 'fight it out' with the Swiss detachment.

In addition to our previously announced dates for the station, there will be 12x RAF Tornados present for a couple of weeks in September while the Sea Harriers of 801 NAS will deploy here in October. Details of these new dates are as follows:

year defence plan, (see last month) is expected to extend Samsung's licensed production programme for 80 Block 52 F-16Cs and 40 similar two-seat F-16Ds by another 20 aircraft. This would be in addition to the \$4 billion F-X new twin-turbofan combat aircraft programme, for which the Boeing F-15K, Dassault Rafale, Eurofighter and Sukhoi Su-35/37 are competing.

● Recently-resumed military procurement by the Republic of Yemen has included 12 L-39C jet-trainers, plus personnel training, spares and technical support, from Aero Vodochody in the Czech Republic. Delivery is expected within the next few months to the originally Soviet-equipped Unified Yemeni Air Force, which has been virtually grounded for the past few

years, because of spares and funding problems.
● The US Air Force has exercised an option for its fourth C-37A, the military designation for the Gulfstream V for delivery in the second quarter of 2000. The 89th AW at Andrews AFB has two C-37As currently in service to provide rapid world-wide transport for government VVIPs.

● The third production F/A-18E/F Super Hornet was delivered to the US Navy by Boeing on 16 March. The first seven production model Super Hornets will enter Operation (OPEVAL) with US Navy test squadron VX-9 at NAS China Lake in May. Meanwhile, a highlight of the recently completed F/A-18E/F sea trials was the first night carrier launch and recovery of a Super Hornet.

22 March-2 April The first of this years ACMI Detachments with 10x French AF Mirage 2000s and 10x Belgian AF F-16's expected.

6-8 April Exercise 'NATINADS 99' (ELINT Exercise).

16-19 April Weekend detachment of 8 Army Air Corps helicopters from 652 Sqn.

10 May-28 May Exercise 'Nomad'. Annual ACMI Exercise involving four nations this year, these being: UK 6x Tornado F3s, Belgium 4x F-16s, France 4x Mirage 2000s and Switzerland 2x F/A-18s

1-18 June Swiss AF ACMI detachment involving 4x F/A-18 (including the two aircraft from 'Nomad').

3-20 September 12x RAF Tornado (Exact details of type and unit will follow).

4-22 October ACMI Detachment of 801 NAS Sea Harrier FA2s.

18 Oct-12 Nov Four weeks of ACMI with 10x French AF Mirage 2000s and 10x Belgian F-16s. Expect a unit change around the 1 November.

1-11 Nov Joining the French and Belgian ACMI Detachments will be 8x Sea Harrier FA2s from 899 NAS.

UK

26-30 April Exercise 'Brilliant Foil' running in conjunction with French Exercise 'ODAX'. As promised, we can now release the following details of the detachments to UK bases.

RAF Boulmer 1x 849 NAS Sea King AEW2.

RMB Chivenor 6x French Pumas (28-29 April only) to carry out two night operations from Nesscliffe training area (nr RAF Shawbury). A day-light rehearsal of this extraction is expected to take place on the 28 April.

RAF Coningsby 12x RDAF F-16s (8 from *Esk 727/730* and 4 from *Esk 723/726*), 4x KNL F-16s from 332 Skv, 1x KNL Falcon 20ECM from 717 Skv.

RAF Lakenheath 31st FW 'AV' F-16s (Still subject to approval. See under Lakenheath in main section).

RAF Leuchars 2x KC-10A.

RAF Lossiemouth Lunch stops and aircraft turnaround by RAF Bruggen Wing Tornado GR1/4s.

RAF Marham 2x GAF Tornados from AG-51.

RAF St Mawgan 4x Coltishall Wg Jaguars (The original plans to send 12 Jaguars to St Mawgan have been abandoned as the planned Coltishall 'OPEVAL' to the station has been cancelled), 6-8x FAF Alpha Jets from *ETO 02.008*, 8x FAF Mirage F1CT from *GC 01.030*.

RNAS Yeovilton 8x No 111 Sqn Tornado F3s

Many stations will come under fire from opposing forces, details of which we hope to carry next month. British forces deploying into Europe include Hawk T1As, Tornado GR1Bs and a VC-10 to France and a further VC-10 to the Netherlands in support of a detachment of Canadian CF-18s to Soesterberg, also taking part in the exercise.

14-25 June Exercise 'Central Enterprise'. Although centered around mainland Europe, the UK will host several aircraft for the exercise. Known so far are the deployment to **RAF Fairford** of B-52Hs from 23rd BS/5th BW from Minot AFB, ND.

Casualties

● Eleven occupants were killed in the crash of two helicopters of the recently-formed **Namibian Air Force** in the Democratic Republic of Congo on 15 January. Namibia bought two HAL-built five-seat **SA-315B Cheetah** (Alouette II) and two seven-seat **SA-316B Chetak** (Alouette III) utility helicopters from India in 1994, which are the only rotary-wing types known to be in NAF service.

● All 28 occupants of a **Nicaraguan Air Force Antonov An-26** tactical transport were killed when it flew into high ground when approaching the coastal airport at Bluefields on 21 January.

● Two **Panavia Tornados** of the **German Luftwaffe's JBG38** from Jever were lost in a mid-air collision over the North Sea in early February. One crew managed to eject and were rescued, but the pilot and weapons systems operator of the second crew were reported missing. In another **Luftwaffe Tornado** incident, an aircraft was severely damaged when it cut power lines over a fjord in northern Norway. The aircrew were uninjured and were able to land the Tornado safely at a nearby air base.

● Poor weather may also have been a contributory cause to the crash of a **Bell UH-1H** utility helicopter of the **Philippine Air Force** near Zamboanga City on 21 February, which killed all four crew members on board.

● A peace agreement negotiated by the **Organisation of African Unity** and reached between

DEBRIEF RAF COTTESMORE

As reported in last month's 'Air Power', a disbandment parade was held on 242 at the station to mark the demise of the TTTE. Aircraft from all three TTTE partnership countries attended the event which included a German AF C-160D 50+65 of *LTG-62*, Italian AF P180 MM62162 and Falcon 50 MM62020, both of 31st Stormo. Visitors from the RAF included a No 32(Tr) Sqn BAe 146 CC2 ZE702, a No 13 Sqn Tornado GR4A ZG707/B and a future resident in the form of Harrier GR7 ZD323/04 of No 1(F) Sqn.

RAF LAKENHEATH

Two further F-15s arrived here on the 5 March on delivery to the IDFAF, the aircraft involved being 94-0297 and 94-0307.

RAF ST MAWGAN

Arriving on Saturday 27 February for a month-long visit to the UK was No 5 Sqn Royal New Zealand AF P-3K NZ4202/02. The aircraft departed to RAF Kinloss during early March and was expected to return to St Mawgan on the 15 March for a further seven day detachment.

'JMC 99/1'

As predicted, the aforementioned exercise kicked off in mid February. Detached for the exercise were the following:

RAF Kinloss The station hosted the overseas aircraft which included French Navy Atlantique's s/ns 19 and 24 and Canadian CP-140s 140101 and 140106, both of 14 Wing at Greenwood. The US Navy supplied VP-45 P-3Cs s/ns 162776/LN-776 for the first week of the exercise and 158566/LN-566 for the second.

RAF Lossiemouth UK forces deployed here with RAF and Royal Navy Hawk T1/As as follows: No 100 Sqn XX335/CD, XX289/CI, XX247/CM, XX285/CH, XX194/CO, XX284/CL and XX325/CE; FRADU XX301, XX311 and XX337; along with FRA Falcon 20s G-FRAJ, G-FRAM, G-FRAU, G-FRAH, G-FRAO, G-FRAF, G-FFRA and G-FRAS.

Advanced details are subject to operational commitments, which may lead to change

(Public entry is not permitted unless stated)

If anyone has any information on exercises or deployments, please send details to 4 Wester Moor Way, Larkspur Chase, Roundswell, BARNSTAPLE, North Devon EX31 3XG or e-mail me direct at

damage.inc@morleylester.force9.co.uk

Our thanks to members of 'SWAG MAG', 'MAR' and 'mil-spotters', Rick Steight, and Royal Air Force Strike Command for their help in compiling this section

➤ FY1999 defence budget, following suspension of the FHI contract, which has now been re-opened to earlier competition from the **Pilatus PC-7 Mk2**. A decision is expected from August this year, although the JASDF is expected to re-confirm its original choice of re-engined Fuji T-3s, followed by first T-7 production orders by April 2000

● Delivery of 34 ex-French Air Force **Dassault Mirage 5F** fighter-bombers and six **Mirage IIIBE** two-seat combat-trainers, bought by the **Pakistan Air Force** from the French government for \$116 million in 1996, has reportedly fallen behind schedule. All 40 aircraft were originally due for delivery by the end of last year, after refurbishment in France by SAGEM. Only two Mirage 5Fs and six

IIIBEs, however, had apparently then arrived in Pakistan, although the remainder are now due to follow by June.

● Further extension of **F-16** production by **Lockheed Martin**, from 3,882 built by early February, is expected from new orders now emerging or in the pipeline. In addition to a **US Air Force** decision to buy 30 new Block 50 F-16C/Ds, with requirements for at least 20 more, another 24 Block 40 versions are included in a new \$3 billion FMS arms package requested by **Egypt**. These would cost around \$1.2 billion, equivalent to a year's US military aid grants to Egypt and would bring the total EAF Fighting Falcon procurement to 220 aircraft. **South Korea's** economic recovery, reflected in a new \$21.8 billion 2000-2004 five-

year defence plan, (see last month) is expected to extend Samsung's licensed production programme for 80 Block 52 F-16Cs and 40 similar two-seat F-16Ds by another 20 aircraft. This would be in addition to the \$4 billion F-X new twin-turbofan combat aircraft programme, for which the Boeing F-15K, Dassault Rafale, Eurofighter and Sukhoi Su-35/37 are competing.

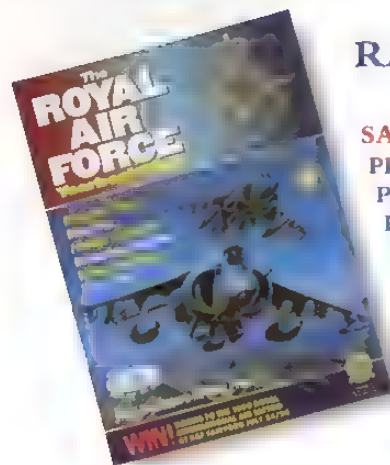
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AIR SAFETY

The AI team sifts through the news for the latest word in air safety-related matters

Uncommanded B737 roll

Another incident involving an uncommanded roll of a **Boeing 737** occurred on 2 March when a **US Airways Metrojet B737-200** banked unexpectedly while cruising at 33,000ft during a flight from Orlando to Hartford.

The crew shut off hydraulic power to the rudder's power-control unit before switching to a back-up system, then made an emergency landing in Baltimore. The anomaly involved an uncommanded left yoke deflection and offset rudder pedals. This in-flight incident followed the discovery of stiff rudder pedals on a **United Airlines B737** during pre-flight at Seattle Airport.

When **NTSB** investigators went to retrieve the Metrojet B737's flight data recorder the following day, they discovered an outmoded 11-channel analogue model, along with a 30min cockpit voice recorder that had overwritten its tape.

Frustrated National Transportation and Safety Board chairman Jim Hall said, 'once again, an investigation into a reported flight control anomaly is being hampered by the lack of basic aircraft data. This is unacceptable.'

The **Federal Aviation Administration** issued a rule in 1997 giving airlines four years to switch to improved recorders.

The FAA and the NTSB have paid close attention to B737 control problems as a result of two crashes dating from the early 1990s. The last one, **USAir Flight 427**, a **B737-400** that crashed near Pittsburgh, killed all 132 aboard and prompted training, design and operational changes, including mandatory unusual attitude recovery instruction that may have helped the Metrojet crew recover their B737. EC

Further FAA ADs

The US National Transportation and Safety Board (**NTSB**) has called on the Federal Aviation Administration (**FAA**) to order a review of aircraft seatbelts following reports that they have unhooked from seats during turbulence and hard landings. The recommendation arose from the NTSB's investigation of a hard landing in February 1998 by an **American Airlines Boeing 727** at Chicago's O'Hare International Airport. Two passengers' seat

belts unhooked from their seats during a landing that separated the rear stairs from the three-engine aircraft and collapsed the landing gear.

The NTSB also found that a seatbelt became released from its seat attachment on a **Boeing 747** flown by **Tower Air** that encountered turbulence over the Atlantic Ocean off the US coast.

Meanwhile, operators of 1,000 **Boeing 727s** must inspect skin joints on the aircraft for fatigue

Peruvian pilot blamed

In February 1996, 123 people died when a **Faucett Airlines Boeing 737** flew into the ground a little over four miles from Peru's Arequipa airport. That crash was the worst aviation accident in Peruvian history. The accident report published in February notes that the pilots disregarded their instruments as they searched visually for the airport.

The chilling reason they could not see the airport is because they were below it. The B737 impacted at 8,015ft, but the airport is some 255ft higher at 8,270ft. A Peruvian judge found that the crew disregarded Peruvian law and other standards in the events leading to the 'unsurvivable' crash. EC

Mid-air scare

A **Boeing 737** bound for Heathrow came within 100ft of a business jet over Essex in what may have been the closest British near miss yet on 26 February.

The two aircraft were flying at 12,000ft over Chigwell at 07.30hrs. The B737 was waiting for clearance to land at Heathrow, and the **Gulfstream** was heading for Farnborough.

An air traffic control spokesman said: 'The business jet was ordered to descend to flight level 120 [12,000ft] by the controller, who was very busy, because he thought it was an empty level. The radar images of the two planes were seen to merge on the screen, but fortunately they both popped out again on the other side.'

'In the opinion of some experienced people there at the time, the gap was thought to have been about 100ft, which would make it probably the closest ever in the UK.' The air traffic controller is believed to have recognised his mistake and ordered both aircraft to take evasive action. It is not known if they had time to do so.

The **Civil Aviation Authority** confirmed that an air traffic controller at West Drayton has been suspended to report on the incident, which is routine procedure. The spokesman refused to identify the Boeing airliner and could not confirm the distance between the two aircraft until after a formal investigation. EC

cracking and make any necessary repairs, according to an Airworthiness Directive (AD) issued by the FAA. The AD was prompted by reports of fatigue cracks in four Boeing 727s operating in the US commercial airline fleet. It also is an outgrowth of the ageing aircraft programme begun with the aviation industry in 1988. The programme is designed to ensure that aircraft remain as structurally sound throughout their service life as they were when they were originally certified.

The AD applies to all series of the Boeing 727, including purpose-built freighter versions. The average age of the aircraft is 25 years, or approximately 38,000 flight cycles.

There are 1,516 B727s still in service, with exactly 1,000 of them registered in the US. The FAA's AD is mandatory for those 1,000 aircraft only, but international civil aviation authorities usually heed each other's safety warnings.

Furthermore, the FAA has ordered operators of certain **Boeing 737** aircraft to inspect and correct potential chafing of float switch wiring in the centre fuel tank. Wire chafing caused by vibration could potentially provide an ignition source inside the fuel tank.

The AD which became effective on 18 March, requires operators of **Boeing 737-100, -200, -300, -400 and -500** aircraft to inspect the wiring for the direct current powered float switch which prevents the fuel tank from being overfilled. It automatically closes the fuelling valve when the fuel tank is nearly full. The agency required removal and inspection

or deactivation of the float switch prior to an aircraft accumulating 30,000 total flight hours or within 30 days.

There are 2,984 aircraft in the world-wide fleet affected by this AD, 1,181 of which are US-registered. Most major US airlines operate the affected aircraft. EC

Pilot error blamed for China crash

An official investigation says pilot error caused a **China Airlines** crash that killed 196 people aboard and six on the ground in 1998.

The report says the pilot approached the runway at too high an altitude, and failed to descend despite being reminded to do so by the control tower. In attempting to come around for a second approach, the pilot pulled the aircraft up too hard, stalling the aircraft's engines and causing it to crash into houses next to the runway at Taipei's international airport.

The **Airbus A300-600R** was en route from the Indonesian island of Bali when it went down on 16 February 1998. Data recovered from the flight recorders pointed to a similar sequence of events, but officials have not yet announced any conclusions. EC

INTRODUCTION

During the most recent conflict in the Balkans, images of Sarajevo International Airport seemed to appear on almost every television news bulletin or constantly occupy the front page of the world's press. The airport, quite literally caught in the centre of one of the most savage wars in modern times, swiftly came to symbolise so many aspects of the Civil War in the former Yugoslavia.

Early scenes were of 'shuttle diplomacy' whereby national and international statesmen or diplomats regularly flew in and out of the airport in desperate attempts to avert further conflict as the hostile situation escalated. These images were quickly replaced by coverage of the UN-sponsored airlift of relief supplies into Sarajevo during the siege of the city. This feat of aerial deliverance, which helped to sustain the inhabitants of the city through the dark days of 1993 and 1994, eventually surpassed the monumental Berlin Airlift of some four and a half decades earlier.

The airport was bombarded on an almost daily basis by Serb Forces stationed in the mountains above, in an effort to shut it to international relief flights carrying supplies to the besieged inhabitants of the city. Many will recall the television images showing military transport crews from a variety of nations performing tactical approaches to the 8,530ft (2,600m) runway at Sarajevo International Airport before landing and performing Engines Running Offloads (EROs). Many of these tactical offloads were performed by members of a large French detachment known as DETAIR who, along with the Canadians and Norwegians, were amongst the first foreign military forces to arrive at the airport in June 1992, and remain at Sarajevo Airport to this day.

In more ways than one, Sarajevo Airport became the only external lifeline to the 600,000 inhabitants of the city who had endured siege-like conditions between 1992 and 1995.

THE PHOENIX RISES

Following the Dayton Agreement of 1995 and in accordance with the General Framework Agreement for Peace (GFAP), Sarajevo was confirmed as the newly proclaimed capital of Bosnia & Herzegovina (BiH). With this came an urgent requirement for a commercial airport that could function as normally as possible after the cessation of hostilities. The federation of BiH realised that the rapid and effective re-establishment of commercial air links from Sarajevo would be a significant key to the post war redevelopment of the country.

Sarajevo/Ildza International Airport, which lies some 6 miles (9kms) south-west of the city centre, emerged from the war with significant damage to its infrastructure and a huge loss of corporate knowledge. Over three years of intensive bombardment, many airport buildings and facilities had been left completely destroyed or badly damaged. For most of the Civil War, the airport had formed part of the Inter Ethnic Confrontation Line (IECL).

Sarajevo Saviours

In the aftermath of a long and violent civil war, Sarajevo Airport lay crippled. Its framework had collapsed and its infrastructure was in tatters, yet through the ruins its future was seen as vital. **MARK ATTRILL** provides the story of how Sarajevo rose from the ashes into the flourishing regional airport of today. All photographs by the author

between the Serbs and Muslims. This meant that there were defensive positions on both sides actually within the environs of the airport and these had been reinforced with large numbers of earthworks and land mines.

The airport itself sits beneath the imposing spectacle of Mount Igman which, at one time, was the only supply route out of Sarajevo for the Bosnian Muslims. As a result, no less than three supply tunnels were dug under the main runway from the military section at Butmir, leading to the heavily fortified city district of Dobrinja on the north side of the airport. During the war, Sarajevans spoke of the tunnels secretly and officials refused to acknowledge their existence; food, weapons, ammunition and even newspapers were moved through the tunnels which often provided the population of Sarajevo with their only lifeline in and out of the city.

In addition, during its airlift operations, the UN Protection Force (UNPROFOR) had found it necessary to construct its own defensive earthworks and trenches around all of the operating surfaces and main buildings of the airport.



Above: Air Bosna Yak-42D T9-ABD in front of the original Sarajevo Airport passenger terminal which will eventually be converted into a cargo warehouse and restaurant. The recently refurbished air traffic control tower can also be seen in the background.

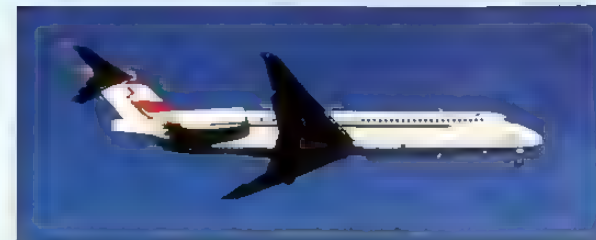
Below: An-72 ES-NOK of Estonian carrier Enimex seen at Sarajevo Airport during a short stay to deliver material for the BiH General Elections.



Once hostilities had ended, and again in accordance with the Dayton Agreement, NATO deployed its Implementation Force (IFOR) in December 1995. One of its principle tasks in Sarajevo was to normalise routine military air operations at the airport. Initially, these measures were designed to facilitate the handling of fixed wing transport aircraft



Left, Top to bottom: Croatia Airlines Boeing 737-200 9A-CTB receives a push back before departing Sarajevo on its daily schedule to Zagreb.



Austrian Airlines operates its MD-80 series of aircraft on a daily service between Vienna and Sarajevo. The airline, one of the first to recognise the potential of the airport, is hoping to increase its schedules with three extra Fokker 70 services a week at the start of the summer season.



Air Bosna is the national airline of BiH, and its Yak-42D T9-ABC is pictured here on its hub's main operating ramp.



Austrian Airlines Airbus A320 and Turkish Airlines Avroliner at Sarajevo International.

second Yak-42D, from Eastern Ukrainian Airlines, and has rapidly built up an impressive list of destinations which now includes several cities in Germany as well as Istanbul, Belgrade and Malmö.

By the autumn of 1996, IFOR had identified an urgent requirement to commence runway repair work — French engineers had discovered that two of the resupply tunnels that had been constructed close to the surface of the ground were showing evidence of subsidence on the main runway and taxiway. As a result, almost 600m of the 2,600m main runway had to be temporarily closed off to eliminate any risk to the heavier transport aircraft of IFOR and the larger commercial aircraft that were now regularly visiting Sarajevo.

on IFOR-related missions. Part of the Dayton Peace Agreement also stipulated that IFOR should assist with the reconstruction and normalisation of commercial air activity in BiH as soon as was practically possible, as part of the overall International Community commitment to nation building. The French DETAIR, which was now able to stand down from its defensive positions around the airport, set about enhancing the basic facilities provided by the airport. Elements of the Civil Airport Authority, which had steadfastly remained at the airport throughout the three year siege, made a strenuous effort to liaise closely with IFOR and to identify and prioritise its requirements for opening up the airport for commercial operations.

During the spring and summer of 1996, temporary repairs to the air terminal were affected in preparation for the resumption of civil air traffic. A comprehensive Memorandum of Understanding (MoU) between IFOR, which still officially maintained custody of the airport, and the Council of Ministers for the Federation of BiH, was drawn up and signed on 2 August 1996. Within weeks, Top Air of Turkey and Croatia Airlines became the first airlines to operate regular services into the city. Air Bosna, recognised as the first airline of BiH and created by the founders of a pre-war executive jet operator, leased a Yak-42D from Lvov Airlines of the Ukraine to begin scheduled services from Sarajevo in September 1996. The airline has since acquired a

The resupply tunnels, which were major feats of engineering complete with narrow gauge railway tracks and fuel pipelines, had been declared national memorials to the civil war by the people of Sarajevo. It became clear that any attempts to fill in the tunnels would become an emotive issue and delicate diplomacy would be required to return the main runway and taxiways back to normal. The commercial viability of the airport, so soon after its rebirth, was clearly also at stake. During the first six months of

commercial operations, the airport handled 26,000 civil passengers and the prospects for 1997 looked good. A decision was finally taken in early 1997 to repair, strengthen or fill those parts of the tunnels that ran immediately under the operating surfaces and this work formed part of a complete resurfacing programme for the main runway.

At the same time, the French Combat Engineers and an American civil engineering company began the meticulous task of de-mining all of the operating areas that surrounded the airport. At least 10 minefields had been laid by the entity armies during the war within the immediate perimeter of the airport and some of these defensive positions denied IFOR access to essential facilities like the runway approach lighting and navigation aids — all of which were in need of maintenance or repair.

FIRST ARRIVALS

Throughout 1997, and with a degree of normality returning to the airport, more commercial carriers became attracted to Sarajevo — particularly from those neighbouring states that had become safe havens for the expatriate Bosnian community. Austrian Airlines became an early arrival when it started its Vienna to Sarajevo summer schedule in March 1997 using MD-87s three times a week. This service was gradually extended over the summer of 1997 and became a daily schedule the following October using either MD-82 or MD-87 aircraft. The airline's current winter schedule has recently been adjusted to cope with seasonal changes in passenger traffic and an Airbus A320 now provides the weekday service with an MD-82/87 over the weekend. Adria, from neighbouring Slovenia also started daily services from its national capital, Ljubljana in the spring of 1997.

BIH, and Sarajevo in particular, is still attracting a large number of individuals from Non Government Organisations (NGOs) and International Aid agencies, many of which have their Headquarters in Switzerland. Swissair was, quite naturally, another European airline that quickly found a niche market in Sarajevo using an Avro RJ80 from its subsidiary, Crossair, to provide a weekday service from Zurich which started in June 1997. Other commercial carriers soon followed suit with Condor and Turkish Air-



Yak-42D UR-42308 in the colours of Donpass Eastern Ukrainian Airlines is shown at Sarajevo whilst on temporary loan to Air Bosna during the routine maintenance of its own Yak-42Ds.

lines also becoming regular customers. By now, the influx of commercial carriers had brought a meteoric growth in passenger numbers at Sarajevo Airport and in the 12 months ending December 1997, the civil airport had handled in excess of 176,000 passengers.

The French DETAIR, by now under the command of the NATO Stabilisation Force (SFOR), continued to be responsible for the maintenance of key installations and facilities at Sarajevo Airport. These included air traffic control, crash and rescue services and airfield security, which were undertaken on behalf of both military and commercial operators. The human toll of five years of war had inevitably robbed the former airport of some corporate knowledge, but, more recently, it has become one of the principal roles of SFOR and DETAIR to gradually hand back responsibility for commercial operations to the local authorities. During the course of 1998, some of the activities previously undertaken by DETAIR (which included snow and ice control and clearance and the security of the air terminal), have developed into joint operations or became the sole domain of the local authorities. Other key tasks, including air traffic control and flight information services, continue to be run by DETAIR, who still operate from the tactical air facilities that were originally deployed to Sarajevo in 1992.

PARTNERS IN PROGRESS

With the establishment of an initial operating capability and the revival of commercial air activity into Sarajevo Airport, it was time to consolidate progress with an ambitious plan to redevelop and reconstruct key elements of the airport infrastructure. The European Bank of Reconstruction and Development (EBRD) has secured significant loans from the European Community (EC) and individual nations, which will contribute towards the repair and modernisation of the airport. Design work for a new US\$9 million air terminal facility was completed by a Dutch company in the autumn and a contractor should begin work in spring 1999. The Norwegian government donated funds to rebuild the civil air traffic control tower, which was almost totally destroyed during the conflict. Following completion of the refurbishment work, French DETAIR air traffic controllers will move in and begin training and joint operations with local controllers drawn from the BiH Department of Civil Aviation (BH DCA). The Italian government is funding repairs to the runway, apron lighting and approach lighting during 1999. Further EC loans, managed by the EBRD, have covered refurbishment work on the airport's fire station, additional ancillary support buildings and the purchase of US\$ 4million worth of apron service and airfield maintenance vehicles amongst other projects. The airport authorities have also invited specialist consultants, principally from Italy and the Netherlands, to produce both long and short-term plans for the airport covering commercial development over the next 20 years.

MILITARY OPERATIONS

Since its arrival in the oppressive days of 1992, the French DETAIR has maintained its presence at Sarajevo International Airport where it remains a powerful and influential contributor to the everyday life of the airport. The current detachment of 146 personnel drawn from the *Armée de l'Air* and the *Armée de la Terre* maintain a busy daily schedule handling a wide variety of NATO and SFOR military aircraft types. A large number of SFOR troop contributing nations including Belgium, Egypt, France, Germany, Italy, Norway, Portugal, Turkey, and the United States continue to use Sarajevo as their main hub of operations. The so-called 'Channel Flight' — an almost daily inter-theatre logistics support flight, using Greek, Turkish and German C-160 and C-130 aircraft — includes Sarajevo in its schedule. These routine logistics missions are interspersed with daily government and military VIP services and a large number of commercially chartered troop rotation flights. DETAIR is also responsible for handling UN and Organisation for Security and Co-operation in Europe (OSCE) support flights; the OSCE actually bases its own aircraft, a Let 410UPV, on the DETAIR ramp at Sarajevo. A considerable number of SFOR rotary wing assets also make use of the French DETAIR from time to time although, with the



Military visitors abound at Sarajevo International Airport. This Polish Air Force Yak-40 'Codling' (047) of the 36th Transport Squadron is one of the more unusual VIP military transport aircraft to be seen on the ramp.

increase in commercial traffic, helicopter nearby military heliport at Ilidza, the Headquarters of SFOR.

Sarajevo Airport is also the temporary home for another military unit, the 214th Aviation Company (formerly the 207th), US Army in Europe (USAEUR). The unit, home based at Heidelberg in Germany, currently operates a detachment of four UH-60A/As from Sarajevo in support of Commander USAEUR who is also Commander SFOR. The unit is also responsible for handling C-12s and UC-35s from its parent unit which regularly transit through Sarajevo on a variety of VIP and communications support missions.

Further progress in commercial air activity was made during the early part of 1998, including the addition of Lufthansa to the list of regular scheduled airlines operating into Sarajevo. This dictated a need to review the MoU between SFOR and the government of BiH, to reflect the progress that had been made at Sarajevo Airport and better suit the new demands of the airport authorities and commercial carriers alike. Some airlines expressed concern over the need to operate expensive positioning legs into the airport, in order to commence a schedule from Sarajevo and others were enquiring about the provision of a limited express mail or cargo service. Consequently, SFOR and the BiH Department of Civil Aviation worked on some adjustments to the MoU in the summer of 1998 which allowed operators to seek permission from the airport authority for overnight parking and the introduction of a limited air freight facility was also permitted. (The first MoU between IFOR and the government of BiH did not permit commercial aircraft to park overnight at Sara-



UH-60L Blackhawk of the 214th Aviation Company detachment which has been based at Sarajevo International Airport since 1995.

jevo International Airport. Practical considerations, including the provision of security measures dictated that one of the conditions of operation into Sarajevo was the ability to carry fuel for the entire round trip and to conduct quick turnarounds). Adria was one of the first companies to take advantage of the changes in the MoU, revising its winter schedule for 1998 to cope with the demand for onward transatlantic flights or schedules to Northern Europe. The airline was granted permission to remain at Sarajevo overnight and currently operate an early morning schedule to Ljubljana using either the popular Canadair Regional Jet or an Airbus A320. Croatia Airlines, another regular user of Sarajevo, was also being granted overnight parking for its three times a week Boeing 737-300 service to Zagreb. On the remaining days of the week, the airline uses an ATR 42 regional commuter aircraft. Late in 1998, JAT Yugoslav Airlines took one small but significant step towards the normalisation of commercial aviation in BiH by adding Sara-



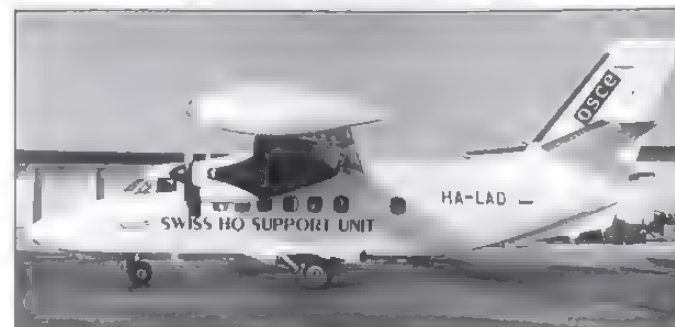
The C-130s of the Egyptian Air Force have been visiting Sarajevo Airport since 1992, supporting the nation's contingent of troops who have been in the city since the early days of the United Nations Protection Force (UNPROFOR). This C-130H (1271/SU-BAB) hails from 16 Squadron, based at Cairo West.

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Left This United Nations An-26 (UNO-183/UR-26580), which operates into Sarajevo International Airport on a daily basis on UN logistics missions, serves as a constant reminder of darker times for both the airport and the inhabitants of the city.



Below left This Let 410 Turbolet is operated from Sarajevo by the Swiss HQ Support Unit which provides logistics support to the Organisation for Security and Co-operation in Europe (OSCE). The aircraft, registered in Hungary, is actually owned by Farmer Air Transport and completes regular missions to regional airports as well as to Zagreb and Vienna.

jevo to its list of destinations. Freedom of movement across Inter Ethnic Border Line (IEBL) had, at last, allowed Bosnian Serbs to use the airport at Sarajevo and the airline, which had routinely operated into Banja Luka Airport in Republika Srpska, found itself able to operate a once a week schedule from Belgrade for the winter season.

The relaxation in the rules governing air freight handling at Sarajevo also attracted a number of inquiries from commercial carriers wishing to start air freight services. Malev-Hungarian Airlines became the first regular air cargo operator into Sarajevo using an An-26 to start a service to Budapest in January 1999. The airline has also arranged to start a twice weekly passenger schedule using a Fokker 70 on the same route for a trial period in March 1999 prior to applying for a full summer schedule.

The airport consolidated its position throughout 1998 and all of the airlines now enjoy extremely good passenger load factors both in and out of Sarajevo. A large percentage of this passenger traffic is still related to the movement of personnel for the international aid agencies and government organisations. There is, however, no doubt that the growth and prosperity of commercial ventures in Sarajevo City, and its catchment area, has also led to a sharp upturn in business travel. Passenger load factors of 95% have regularly been recorded throughout the summer and the total number of civil passengers handled by Sarajevo International Airport exceeded 280,000 for the 12 months ending December 1998.

Sarajevo has also become a Mecca for many other commercial carriers, operating chartered services on behalf of BiH and government bodies, NGOs and international aid agencies. Balkan Bulgarian Airlines, operating on behalf of the UN for International Police Task Force rotations, has been a regular visitor to the airport. Other

nations use civil executive company jets for government visits so the airport has also handled a fair number of General Aviation and executive transports over the last two years. The resurgence of business in Sarajevo has also witnessed a growth in the number of local travel agencies and airlines offices that have had a charter aircraft pending the arrival of their own assets. Bio-Air recently chartered an Estonian-registered An-74 from Ankara-based Enimex Limited for a number of flights to Italy and Scotland. In the long term, the airline hopes to base the An-74 in Sarajevo and offer regular services to Istanbul and Jeddah, Saudi Arabia. Air Commerce is another local aviation company which is in the process of acquiring a Let 410UPV-E Turbolet to start domestic passenger and freight services from Sarajevo to the other principal airports of BiH at Banja Luka, Mostar and Tuzla.

Air Srpska is another new airline for the region, and has some promising ideas for the future. It has been formed by a group of businessmen from Republika Srpska (RS), including a number of former JAT Yugoslav Airlines employees who now reside in RS. The airline completed its inaugural flight from Belgrade to Banja Luka on Friday 29 January 1999. JAT has initially provided one ATR 72 aircraft to the airline which is currently operating in its own colours, albeit with a Yugoslavian registration. JAT will also provide technical support and maintenance for the aircraft. Pilots will come, initially, from JAT with a plan to introduce RS based ex-JAT aircrew in the near future. The airline will operate schedules from Banja Luka to Belgrade, Zurich and St Gallen. The airline is also planning to replace the old JAT schedules to BiH with a new Belgrade-Sarajevo-Banja Luka (and return) service. Once the airline is established, the company will apply for traffic rights to Paris and London. A Boeing 737-300 will be operated on these longer flights.

Despite its obvious close links, it must be reiterated that Air Srpska is not a subsidiary of JAT with the problems regarding the Yugoslavian registration of aircraft leased to Air Srpska understood. In order to avoid any possibility of impoundment, Air Srpska will be pursuing registration through the Department of Civil Aviation for Bosnia & Herzegovina and its own Civil Aviation Department as part of the preparatory work for traffic rights to West European destinations.

Meanwhile, other airlines are planning increases to their schedules to BiH for the summer season including Austrian Airlines which is expected to add a three times a week overnight service to Sarajevo to its daily MD-80 schedule. The airline will initially use a Fokker 70 aircraft. Tyrolean Airways, part of the Austrian Airlines Group is also increasing its Dash 8-300 schedules from Vienna to Banja Luka and Mostar from late March 1999.

CONCLUSION

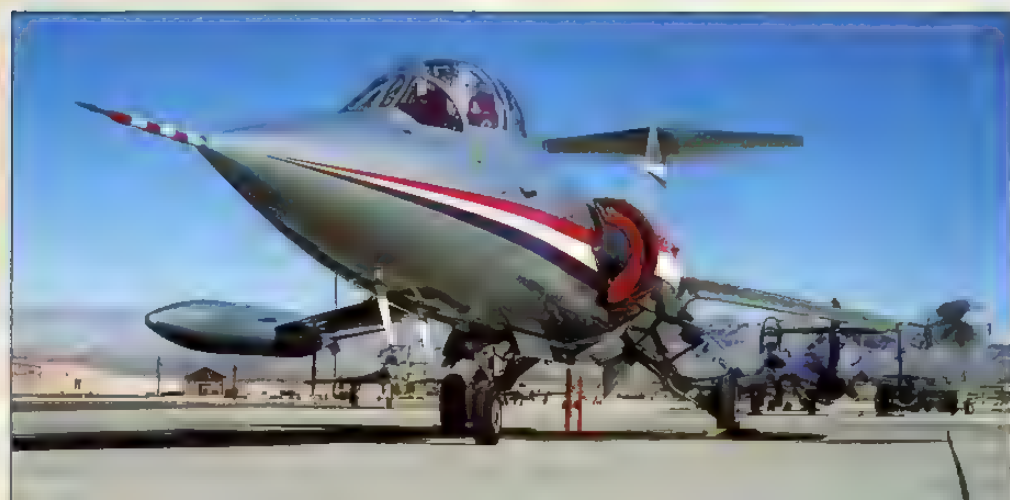
There is absolutely no doubt that Sarajevo International Airport suffered a huge amount of devastation during the extremely long and violent conflict that ended less than three years ago and literally besieged the capital of Bosnia & Herzegovina. Like so many other aspects of everyday life in BiH today, commercial aviation is slowly but surely recovering from five years of war and neglect. However, it has to be said that the pace of reconstruction and normalisation at the airport in particular has been impressive. A great number of organisations and individuals have clearly recognised its importance to the infrastructure and economic welfare of the capital as well as the nation itself and have vigorously pursued its rehabilitation and reconstruction. Neighbouring countries in Europe were swift to re-establish their routes into BiH and have invested heavily in the reconstruction programme. New routes to and from Sarajevo are being added on a weekly basis and new aviation businesses are flourishing as the International Community and SFOR continue to implement their commitments to nation building under the Dayton Agreement.

Those actively involved in the redevelopment of the airport know that there is still a long way to go and that many new challenges lie ahead. They also have the determination and vision to succeed in realising Sarajevo International Airport's potential as a significant crossroads to aviation in Southern Europe.

Acknowledgements: For their invaluable assistance in the preparation of this article, the author would like to thank: Mr Bakir Karahasanovic, Airport Director Sarajevo International Airport, Mr Mahmud Cico, Senior Air Advisor Sarajevo Airport Authority, Col Pellissier, Lt Col Henri Geze, Commandant Erik Chatelus and Capitaine Olivier Mrowicki, French DETAIR Sarajevo Airport.

Precious Metal

It doesn't get much better than this! When the USA's Classic Jet Aircraft Association held its annual convention at Nellis AFB the week of the attendees arrived the only way they knew from FRANK E. MORMILLO reports.



Simply stunning. North American F-100F Super Sabres on the ramp at Nellis AFB being prepared for departure at the conclusion of the CJAA Convention, while a CF-104D awaits its turn. The Super Sabre in the foreground wearing New Mexico ANG markings hails from Texas, while '63948' beyond arrived from Indiana. The Starfighter, belonging to Mark Sherman, was flown home by Darryl Greenamyre who, after take-off from Nellis, brought the sleek jet back for a high-speed pass over the runway before rocketing off into the blue.

For a brief period only, the mountains surrounding Nellis AFB echoed to the sound of a different note. Instead of the usual high-tech whine emanating from rows of Pratt & Whitney powerplants buried in the grey fuselage of F-16s and F-15s, there were thunderous roars from natural metal F-100s and howling notes from Hunters and F-104s — all accompanied by thick black smoke trails that charred the gin-clear desert skies.

In a somewhat dramatic switch from normal operations, the US Air Force Weapons Training Center allowed 100 members of the Classic Jet Aircraft Association to hold their annual convention at Nellis AFB, Nevada, between 10-14 February. In doing so, arguably the US Air Force's most technologically-advanced station played host to 31 privately owned ex-military jets that turned the ramps back in time into truly evocative scenes from the 1950s and '60s.

Between 40 and 50 of these classic aircraft had been expected for the event, but while the weather proved to be ideal in Nevada, the same could not be said for other parts of the United States and a number of aircraft stayed home. Of course, jets are expensive to fly and some attendees came to the convention by airliner just for that reason. *Aircraft Illustrated* hooked up with one such attendee, G. N. Butterworth, who took time out to explain the event. Butterworth, a flight instructor

and charter pilot from Florida, now rebuilds Lockheed T-33 Shooting Stars. Currently working on his third T-33 project for a customer, his restored jets are actually registered with the FAA as 'Butterworth T-33s' because he builds them up from parts rather than merely refurbishing complete airframes.

The CJAA is an outgrowth of Jim Robinson's Combat Jet Aircraft Association which Butterworth says was basically a private museum at first. Although Robinson eventually donated his collection of jet warbirds to the EAA Museum, he is still active in the CJAA which has 195 paying members today and counts 700 people on its mailing list. Butterworth, who joined the CJAA in 1990, says that the US organisation has been holding annual conventions since 1989, usually alternating from one coast to the other each year. The 1999 convention was, however, the first to be held on an active military base.

'The Air Force really rolled out the red carpet for us. The food, accommodation and hospitality were first class', said CJAA member and Aero L-29 Delfin owner Pete Bonfiglio of Big Bear Lake, California.

Unfortunately, base activity precluded the members from flying their aircraft while at Nellis. They arrived on 10 February and departed on either the afternoon of 13 February or the morning of 14 February. However, while at Nellis AFB the CJAA members were given tours of the

famous 'Red Flag' air combat training facility and the *Thunderbird's* hangar and museum. During their stay, the members also took part in desert survival and instrument refresher training lectures and were given flight physiology indoctrinations.

Although hosting the event on an active military base did limit the organisation's flying to arrivals and departures and public access was limited, the jets were available for public viewing on the ramp during one afternoon of their stay.

Among the stunning array of classic jets present for the convention were a magnificent pair of North American F-100F Super Sabres, a Canadair CF-104D Starfighter, a North American F-86F Sabre, a Hawker Hunter Mk58, a Folland Gnat T1, a BAC Canberra TT18, a Lim-6bis, a quartet of Lockheed T-33 Shooting Stars, a Soko G2 Galeb and a pair of TS-11 Iskras together with a large number of Aero L-29 Delfin and L-39 Albatros trainers. Also taking part in the event were a NASA Northrop T-38 Talon flown in by CJAA board member and Space Shuttle astronaut Curt Brown as well as a Canadair CT-133 Silver Star and a Canadair CL-41 Tutor from the Canadian Armed Forces.

'We're not really familiar with the organisation and didn't know what to expect; but we've met some really incredible people from different backgrounds and different ages — it's great', said CL-41 pilot Capt C. J. Davison. Together with Capt Jake Gaudet, Davison brought the CL-41 to Nellis from Moose Jaw, Canada while the Silver Star came from Cold Lake.

'Our goal is to be the united voice of jet aircraft owners and flyers with the FAA — a stronger voice in communicating our needs', said Cathy Hansen, wife of Al Hansen who rebuilds classic jets at Mojave, California. Al Hansen flew the F-86 Sabre to the convention while Cathy arrived in the backseat of a T-33 Shooting Star.

'There are people who think these jets shouldn't be in the air', continued Butterworth. 'I honestly don't know why. I guess there are factions of people who don't think. You can fly a P-51 or a B-25 with no problems; but as soon as you say 'jet' they put us in another category. These jets are actually easier to maintain and safer to fly than piston-engined warbirds. We have a pretty good record' Butterworth concluded.

Western CJAA Representative
Kay Eckhardt is considered by many as the person who actually keeps the organisation together.

Anyone interested in the organisation can write to him at 1332 Roxbury Road, Salt Lake City, Utah 84108, USA or call him on (801) 581-1332.



Above: Kay Eckhardt flew this ex-Swiss AF Hawker Hunter Mk58 that he owns in partnership with Bill Russell to the CJAA convention at Nellis AFB from Mojave, Ca. (Photo taken from Bill Russell's Hispano HA200 Saeta with Ray Diekmann at the controls on an earlier flight).

Right: This Indiana-based F-100F Super Sabre was one of two of the type present for the CJAA convention — a fine testimony for why classic jets should be allowed to continue operations in private hands.

Below: Al Hansen brought this ex-Tracor Flight Systems North American F-86F Sabre target tug to the CJAA convention.

Bottom: A welcome sight! Alive and well and operating out of Boise, Idaho, is ex-Royal Navy Canberra TT18 (ex-WJ574) which is pictured at Nellis with a Canadian Armed Forces CL-41 Tutor in the background.



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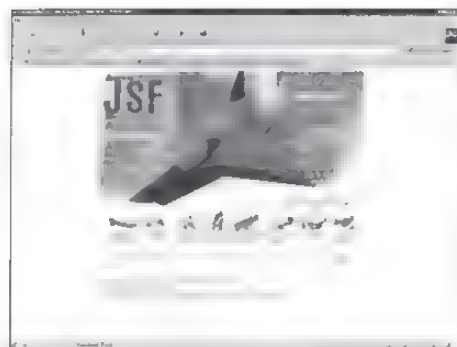
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HOWARD CURTIS reviews the web site of the world's largest aircraft manufacturer, Boeing

The Boeing Web Site, <http://www.boeing.com/>



Ask anyone with even the most limited knowledge of aviation to give a list of aircraft manufacturers and it is almost certain that Boeing will be mentioned. This company, which now includes other famous names such as North American, Douglas and McDonnell in its heritage, has become a giant with facilities spread through the United States and, indeed, the world. At a time when other companies may have chosen to concentrate on the production of either military or civilian aircraft, Boeing has successfully managed to continue producing both. Consequently its web site will offer plenty of interest to the military and civilian enthusiast, as well as the aviation historian.

It will come as no surprise that Boeing's web site reflects the size of the company and consequently this review will only present a flavour of the contents of the various sections — to go into detail would take several articles to do the site justice! The Boeing site is divided into several large sections that cover topics such as news, business and finance, commercial designs, military designs and the like. Delving into each section will reveal further large sub-sections that will also be of interest.

News flash

The news section may be an initial stopping point for those who wish to keep up to date with the latest developments at Boeing. Given the many facets of the company, it will come as no surprise that this part of the site is large, varied and

regularly updated. Here you can read first many of the news items which eventually find their way into aviation magazines.

For the researcher, all news releases from Boeing from January 1995 are to be found on the site, along with news releases from McDonnell Douglas from January 1996

until its merger with Boeing in 1997. Many of these news releases come with images, while the 'feature stories' part of this section goes into developments in a lot more depth, with links to related pages elsewhere on the Boeing site. A 'media kits' area will be of interest to the space travel enthusiast, giving details in depth about the Space Shuttle programme and information about the latest Shuttle mission.

A nice feature of the news section is that it makes use of the multimedia possibilities offered by the Internet by providing not only text and images but video as well. Here you can watch video of various Boeing products as well as the latest broadcast from Boeing TV (although you may need to download extra software to view the latter).

Alongside news releases, this part of the site offers much more, including a breakdown of commercial aircraft orders and deliveries, sections on technical issues and safety, articles from Boeing's in-house magazine and even the text from speeches made by important personnel from the company.

It's a gift

A major section of this site is titled *More Information About Boeing*. Included is a fascinating set of pages dedicated to the history not only of Boeing but also of McDonnell Douglas and North American. The history pages include plenty of images (as well as comprehensive information about many of the products that made these great companies famous) and is well

worth a look. For those who wish to find out even more, this section provides a reading list of books about the company.

Boeing's gift store can be accessed through this section and gifts can be ordered on-line here, too. The list of products is lengthy and occasionally surprising — alongside the expected items such as mugs, clothing, posters, pens and models are the less obvious such as towels and even chocolate! The gift store also offers a screen saver that you can purchase, although another screen saver is available free to download from the gallery.

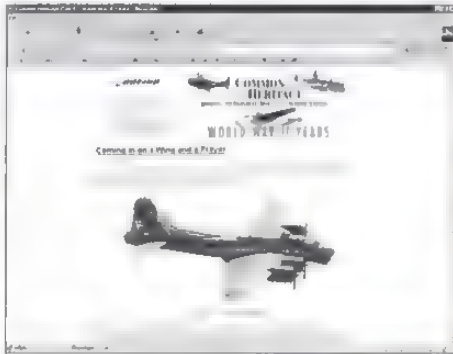
For those who wish to contact Boeing, this section is the one that provides contact information, along with maps of Boeing sites and details for those who wish to visit the company. Tours are possible at Boeing's Everett facility and visits can be made to the James S. McDonnell Prologue Room at St Louis. In searching through this section, it was also nice to read of Boeing's active involvement in local education in the vicinity of its sites and also in the International Relief Delivery Flight Programme.

For many however, three sections of the Boeing site will be of greatest interest — the ones covering its commercial arm, military aircraft and helicopters.

Commercial break

The commercial section is packed with information about current products but also gives plenty of space to previous jet designs. Current products mentioned here include the most recent B737 variants, the B747-400, B757, B767, B777, MD-11, MD-80, MD-90 and B717, along with the Boeing Business Jet, which has a section all to itself. Each design is covered in several web pages, which include exterior and interior details, a design overview with specifications and more besides. For each design a link is provided to the gallery area of Boeing's site, where some superb images can be downloaded.

For those interested in previous designs, these are given extensive coverage, with pages dedicated to the B707, B727, early models of B737 and B747, DC-8, DC-9 and DC-10. In each case, there are similar pages as for the current designs



mentioned earlier, along with links to the gallery, where the choice of images is a little more limited.

The commercial section also includes other pages of interest covering new projects such as the B737-700X, B747-400X and B777-300X, alongside pages on the safety of air travel, orders and deliveries and associated Boeing businesses.

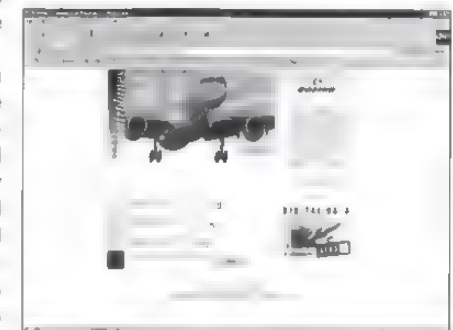
Military precision

The military enthusiast is catered for amply with this section of the web site, which emphasises just how many current designs and projects involve Boeing. While there is some variation, for each type you will find details and specifications and a fair number of excellent images, along with three-view drawings, news releases, video clips and even audio clips for lovers of jet noise! There are also links to related sites within this section.

Types covered include fighters and attack designs in production such as the AV-8B Harrier II, F-15 Eagle, F/A-18E/F Hornet, and F-22 Raptor, along with pages on the proposed Joint Strike Fighter. Earlier F/A-18 Hornet designs are given a separate mention, while the many fans of the F-4 Phantom II will find their needs catered for in an excellent section which also contains some superb images.

Boeing has a major involvement in the B-2 Spirit programme and this section has space dedicated to the B-2, along with other bombers such as the B-1B Lancer and the B-52 Stratofortress.

Boeing is currently producing 120 C-17 Globemaster III transports for the US Air Force and



Aircraft Illustrated

Aviation sites on the Internet

No 43(Fighter) Squadron RAF

<http://www.fighting-cocks.demon.co.uk/>

This web site is home to the RAF's No 43 Squadron, the 'Fighting Cocks', which operates Tornado F3s from Leuchars. A history page gives a brief background on the squadron, as well as having links to images of the various aircraft types which the squadron has operated over the years. The squadron's current mount, the Tornado F3, is covered in a lot more depth, while other pages show and detail the squadron's battle honours, standard and badge. There is a small shop that offers badges, T-shirts, prints and the like and you can print off an order form from the site if you wish to purchase any of these. Finally, a set of RAF links will take you to other related sites.

The Aircrew Association

<http://www.life.ac.uk/aircrew>

The Aircrew Association is for all those who have been 'awarded a flying badge denoting qualification within an officially recognised aircrew category of HM Armed Forces, and the Armed Forces of Allied Nations' and seeks to help aircrew keep in contact via its quarterly magazine 'Intercom' and via its web site. The web site consists of a list of branches and contacts in the UK and overseas and a number of discussion forums, where messages can be left. The 'General Aircrew Association Forum' is for general topics, the 'Special Projects Forum' covers specific members' projects and the 'Family Forum' is for the children and grandchildren of Aircrew Association members. For many former aircrew, probably the 'Trace a Member Forum' may turn out to be most useful.

All About Guppys

<http://www.thegrid.net/daren>

Daren Savage has amassed a mind boggling amount of information about the Aerospacelines Guppy and similar aircraft at this web site. On first entering the site, it may not be clear that much is there, but by clicking on an image of a Guppy, the tour begins! Separate pages cover the Pregnant Guppy, Super Guppy, Mini Guppy, Guppy 101, Guppy 201,

actively promoting this design for the RAF's transport needs, as the pages in this section suggest. The Boeing 767 is now being proposed as the successor to the C-135 in several military guises, as a tanker, transport and AWACS platform and again you can read all about this on the web site. The DC-10 and MD-11 are both now being put forward as types for conversion to tankers and the site has pages detailing these proposals. Other new or proposed designs covered include the MD-17 airlifter, B747 Airborne Laser, C-32A VVIP transport (Boeing 757), E-6 Mercury, T-45 Goshawk trainer, B737-700AEW and the X-36 tail-less research aircraft. Boeing is also a partner in the Nimrod 2000 project and this section has detail about it. Finally, this section also includes material on Boeing designs currently in service. Included here are the KC-10 Extender, KC-135 Stratotanker, VC-25A (Air Force One), E-3 Sentry, E-4B airborne command post and T-43.

Rotor-craft

With its take-over of McDonnell Douglas, Boeing added a number of current and proposed helicopter designs. Given its close links with

Sikorsky on other products, Boeing now offers a wide range of military rotorcraft designs, all of which are detailed in its rotorcraft section. As with the military aircraft section, there is plenty of information here on each type, with technical details, images, video and audio clips provided, along with links to other related sites.

The Apache attack helicopter, now being produced in the AH-64D variant for both the US Army and the British Army Air Corps, is well represented in this section, along with the CH-47 and MH-47E Chinook. Boeing's CH-46 and UH-46D Sea Knight are also given ample coverage.

Boeing is working in conjunction with Sikorsky on two new designs, the RAH-66 Comanche and the innovative V-22 Osprey tilt rotor, both of which are also given plenty of coverage.

Elsewhere

Given that Boeing is such a huge company, not surprisingly there is much more to its site. Other sections cover space systems, electronic and information systems, missile systems and tactical weapons — space precludes any detailed coverage of these here.

Conroy CL-44 Guppy and A300-600ST Super Transporter. Each page has a history of and background to the design, alongside photographs and often video also. Other pages give dimensions and the like of the Guppy family and there is even a page dedicated to the radio-controlled Super Guppy which Dan and Daren Savage built and flew themselves! With links to other sites and a fascinating page showing 'artists' conceptions' or 'what might have been', this site is well worth a look.

The Euroscot Web Site <http://www.euroscot.com/>

Euroscot Express operates a single ATR-72 from Bournemouth International Airport to several Scottish destinations. Its small web site gives useful information about the airline for both travellers and enthusiasts. A timetable is provided, along with information about special offers and a booking/enquiry form. Another page gives a company overview and provides recent press releases, while elsewhere on the site are links to tourist web sites related to the area around Bournemouth as well as its Scottish destinations. Finally there is a contact page for those who wish to get further information from the airline.

Ex-FRADU Hunters Homepage

<http://www.stringbag.demon.co.uk/hhnters.htm>

Mark Russell has created several sites covering Royal Navy aircraft and this small site is typical. Here he documents the history of each and every Hawker Hunter that served with the Fleet Requirements & Air Direction Unit at Yeovilton. With images of each aircraft, details of its current status and links to similar sites, this is a fascinating resource. The FRADU 'Blue Herons' aerobatic team is also given a mention.

Liberty Helicopter Tours & Charter <http://www.libertyhelicopters.com/>

Liberty Helicopters boasts that it is 'currently the only authorized helicopter sightseeing company in New York City'. Operating a fleet of AS350BA helicopters from a couple of locations, Liberty Helicopters has a variety of aerial tours on offer and details of these are found at the web site. Maps are provided, showing where the two heliports are that Liberty uses, along with an on-line reservation form and an information request form. A useful site for the New York tourist.

Other areas which may be of interest to some include an employment section, where you can search the list of vacancies at Boeing and even build and submit your own résumé. The investor relations/financial section includes everything from details about Boeing's stocks and shares and copies of recent annual reports to prices of its aircraft. Shareholders will also find useful details in the corporate secretary section, which is tailor-made for them. Finally, and perhaps most usefully, Boeing's site comes with a search facility to save the hours that you could spend trawling through this site looking for a specific piece of information!

In conclusion

It is hard to think of many enthusiasts who would not find anything of interest in Boeing's web site. The site itself initially creates the impression that it is not that large but as you begin to follow some of the links within it, the enormity of the site becomes much more apparent. Each page has clearly been put together with thought and none of the pages will take long to load using a fairly fast modem. Given the amount of designs which now comprise the history of

this great company, there will always be scope for even more information on the Internet — the DC-3 alone deserves a site all to itself — but Boeing's site does go some way towards providing this.

However, what is abundantly clear from the Boeing site is that it is not simply geared to those who might wish to purchase its products but it is also designed to educate and inform and to stimulate further enthusiasm for aviation. The enthusiast will find plenty of information and some superb images to download from the site, although some great designs from Boeing's past do not feature extensively in the gallery. This is perhaps the one disappointment in what is without doubt one of the best aviation sites on the Internet.

Your continued feedback to this column is appreciated and we would be pleased to correct any errors or misunderstandings. A list of all the sites covered in this column and much more can be found at **The 'AirNet' Links Site** <http://www.howardcurtis.mcmill.com/>. Should you wish to contact the author by e-mail, please do so at AirNetHC@aol.com or at HJCurtis@cwcom.net.

Canadian pride

In a spread exclusive to *AI*, **MIKE REYNO** of **SKYTECH IMAGES** captures the full glory of this CF-18 Hornet fresh from the paint shop where it received these striking colours to celebrate the Royal Canadian Air Force's 75th anniversary.

The Canadian Air Force actually became separate from the Royal Canadian Navy and Canadian Army some 79 years ago on 18 February 1920. The 'Royal' title was granted on 1 April 1924 and thus the Royal Canadian Air Force was born. The service was at its height during WW2 with more than 250,000 enlisted men and women. It was the fourth largest of the Allied air forces after those of the US, Soviet Union and the UK.

To commemorate the 75th anniversary of the RCAF, 410th TF(OT)S based at 4 Wing Cold Lake, Alberta, (the operational training squadron for the Canadian CF-18 fighter pilots as well as home to Canada's Fighter Weapons Instructor Course — 'Top Gun'), adorned one of its 27 CF-18s (188718) in the air force's traditional blues. The Hornet was complete with old RCAF-type roundels, RCAF tartan and the King and Queen crowns on each tail. Flown by 'demo' pilots Capt Rob Mitchell and Capt Mike Mirza, the aircraft will appear at air shows across North America. Who said the Canadian Air Force did not know how to party!



Military Markings

PETER R. MARCH

With the new 1999 edition of *Military Aircraft Markings* now available, the listing this month details the foreign aircraft that appeared in the 1998 edition, but are no longer listed, for the reason given. Some of the deletions might only be temporary, such as the Catalina 9754 that is now to be rebuilt to flying condition, while some others are simply placed in storage and might resume flying at some point in the future.

Serial	Type	Other identifier code	Owner or operator	Location or fate
HISTORIC AIRCRAFT				
Argentina				
AE 406	Bell UH-1H Iroquois		Repainted in US marks	
Botswana				
QJ5	BAC Strikemaster 87 (G-BXFP)		Repainted as NZ6361 by May 1998	
QJ6	BAC Strikemaster 83 (ZG808/G-BXFW)		Sold to South Africa as ZU-PER February 1998	
Canada				
9754	Consolidated PBV-5A Catalina (VP-BPS) [P]		Crashed 27 July 1998, The Solent	
20385	CCF T-6J Harvard IV (G-BGPB)		Repainted as FAP 1747 by May 1998	
France				
59	Dassault Mystère IVA [2-SF]		Scrapped at Cardiff, February 1998	
73	Morane-Saulnier MS505 (G-BWRF)		Returned to Germany, 1998	
192	MH1521M Broussard (G-BKPT) [44-GI]		Sold as N81562, August 1998	
290	Dewoitine D27 (F-AZJD)		Repainted as 06	
Germany				
3235	Messerschmitt Bf110C-4 (LN+ER)		Sold to New Zealand	
3579	Messerschmitt Bf109E-1		Sold as N81563, August 1998	
151591	Messerschmitt Bf109G-10 (D-HDME) [2]		To Germany Spring 1997	
28+02	Aero L-39ZO Albatros (140/G-BWTS)		Sold as ES-YLL March 1998	
28+10	Aero L-39ZO Albatros (150/G-BWTT)		Sold as N298RD, January 1998	
Hungary				
503	Mikoyan MiG-21SMT (G-BRAM)		Repainted in Soviet marks	

Spain			
B.21-103	CASA 2 111B (He111H-16)		Arrived in UK as B.21-27
T.9-16	DHC4 Caribou (N52NC)		Delivered to the US by April 1998
T.9-19	DHC4 Caribou (N55NC)		Delivered to the US by April 1998
T.9-20	DHC4 Caribou (N56NC)		Delivered to the US by April 1998
Switzerland			
J-4104	Hawker Hunter F58A (G-PSST)		Repainted as G-PSST June 1998
J-4105	Hawker Hunter F58A (G-BWOU)		Repainted as XF303 by August 1998
USA			
33	Boeing-Stearman N2S-5 Kaydet (38122/G-THEA)		Sold as E1-PYR, May 1998
41	NA T-6G Texan (G-DDMV) [BA]		Repainted as 493209 by 1998
76-029	McD F-15A Eagle		Scrapped, 1997
76-124	McD F-15B Eagle (LN, 48 LSS)		Scrapped, 1997

OVERSEAS AIR FORCES

Eire			
173	DHC1 Chipmunk T20		Sold as N65350
181	Percival P56 Provost T51		Scrapped
221	Fouga CM17C Super Magister 79-3 KE1		Scrapped 1998
233	S.A. SF 260MC - SYAS		Scrapped 1998
Belgium			
FA-46	General Dynamics F-16A		Withdrawn from use
MT-33	Fouga CM170 Magister		Withdrawn from use, 1998
ST-30	SIAI Marchetti SF260MB		Withdrawn from use, 1998
ST-34	SIAI Marchetti SF260MB		Withdrawn from use, 1998
A-55	Sud SA318C Alouette II		Withdrawn from use, 1997
G-92	Sud Alouette II		Withdrawn from use, 1998
G-95	Sud Alouette II		Withdrawn from use, 1998
Chile			
987	Lockheed C-130B Hercules		Withdrawn from use, 1998
999	Lockheed C-130B Hercules		Withdrawn from use, 1998
Czech Republic			
4607	Aero L-39C Albatros		Crashed, 18 February 1998 Benátky
3756	Miyoyan MiG-21UM		Crashed, 8 June 1998, near Ceske Budejovice
7711	Miyoyan MiG-21MF		Crashed, 8 June 1998, near Ceske Budejovice
0102	Mil Mi-24D		Withdrawn from use
0147	Mil Mi-24D		Withdrawn from use
0221	Mil Mi-24D		Withdrawn from use
0928	Mil Mi-24V2		Crashed 16 November 1998, near Olomouc
Denmark			
E-089	General Dynamics F-16A		Not delivered

France			
02	D-BD Alpha Jet [F-ZWRU]		Withdrawn from use
E27	D-BD Alpha Jet		Crashed 8 April 1986
E40	D-BD Alpha Jet		Crashed 8 April 1986
E174	D-BD Alpha Jet		Crashed 25 July 1987
167	Dassault Falcon 20C		Withdrawn from use, November 1998
249	Dassault Mirage F 1CT		Crashed 18 January 1994
801	Dassault Mirage F 1CR		Withdrawn from use
BY1	Dassault Mirage 2000-5		Withdrawn from use
X7	Dassault Mirage 2000C		Withdrawn from use
D01	Dassault Mirage 2000D		Withdrawn from use
347	Dassault Mirage 2000N		Crashed 16 July 1998, near Dijon
45819	Douglas DC-55F		Withdrawn from use, April 1998
1	Morane Saulnier MS760 Pans		Withdrawn from use, 1998
35	Morane Saulnier MS760 Pans		Withdrawn from use, 1998
70	Morane Saulnier MS760 Pans		Crashed 10 February 1992
73	Morane Saulnier MS760 Pans		Withdrawn from use, 1998
113	Morane Saulnier MS760 Pans		Withdrawn from use, 1998
01	Nord 262 Frigate		Withdrawn from use
3	Nord 262 Frigate		Preserved, La Ferté Alais
55	Nord 262A Frigate		Withdrawn from use
A14	SEPECAT Jaguar A		Withdrawn from use, 1998
and A23	A37 A38 A39 A40 A46, A48, A70 A86 A131		Withdrawn from use, 1998
E11	SEPECAT Jaguar E		Withdrawn from use, 1998
E13	SEPECAT Jaguar E		Withdrawn from use, 1998
120	Aérospatiale SA321G Super Frelon		Withdrawn from use
64	Breguet Br1150M Alize		Crashed 12 January 1998, Nîmes
02	Breguet Br1150 Atlantique 2		Withdrawn from use
04	Breguet Br1150 Atlantique 2		Withdrawn from use, 1997 (dumped at Nîmes)
34	Dassault Super Etendard		Crashed 4 February 1992
42	Dassault Super Etendard		Crashed 29 April 1982
53	Dassault Super Etendard		Crashed 7 July 1987
37	LTV F-8P Crusader		Withdrawn from use, 1997
16	Nord 262A Frigate		Withdrawn from use, 1998
and 28 43 59, 61, 62 65, 104			
Germany			
All VFW-Fokker 614-100s were withdrawn from use in 1998			
37+05	McD F-4F Phantom II		To 49th FW USA, 1997
and 37+18 37+19 37+21, 37+23 37+24 37+25 37+30, 37+40, 37+41, 37+57 37+69 49th FW USA, 1997			
37+78	McD F-4F Phantom II		Crashed 4 June 1998, Goose Bay, Canada
38+39	McD F-4F Phantom II		To 49th FW USA, 1997
38+51	McD F-4F Phantom II		To 49th FW USA
38+63	McD F-4F Phantom II		Crashed 14 October 1998, White Sands Range, USA
			To 49th FW, USA, 1997
			To TTC, USA, 1997
38+72	McD F-4F Phantom II		
43+57	Panavia Tornado		
and 43+58, 43+88 44+28 44+59			
44+82	Panavia Tornado		Crashed, 3 February 1998, near Lippstadt
45+26	Panavia Tornado		Crashed, 20 January 1998, North Sea
45+48	Panavia Tornado		Crashed 22 August 1998, Eggebek
46+06	Panavia Tornado ECR		Crashed 18 August 1998, Monheim, Bavaria
61+02	Breguet Br1151 Atlantic (Elint)		Withdrawn from use
89+59	Westland Sea King HAS41		Crashed 17 November 1998, Helgoland
98+27	MBB Bo 105C		Withdrawn from use
Greece			
750	Lockheed C-130H Hercules		Crashed 17 December 1997
Hungary			
202	Antonov An-26 (02202)		Withdrawn from use, 1998
Italy			
MM62103	Aeritalia G-222TCM		Withdrawn from use
and MM62110 MM62112 MM62118 MM62132			
MM6741	Lockheed F-104S Starfighter		Withdrawn from use
and MM6742 MM6747 MM6749 MM6750, MM6784 MM6794, MM6798, MM6804			
MM6827	Lockheed F-104S Starfighter		Crashed 15 April 1997
MM6908	Lockheed F-104S Starfighter		Withdrawn from use, 1998
and MM6831 MM6890 MM6910			
MM7017	Panavia Tornado		Crashed, 15 July 1998, Alciana, Spain
MM577	Piaggio-Douglas PD-808		Withdrawn from use
and MM578, MM61948, MM61949, MM61951			
MM61953	Piaggio-Douglas PD-808-TA		Crashed 15 September 1993
and MM61956 MM61957 MM61958 MM61959 MM62015			
Kuwait			
KAF 321	McDD DC-9-32CF		Sold as N724HB July 1998
Netherlands			
J-140	General Dynamics F-16A		Crashed, 21 May 1998, Goose Bay, Canada
J-213	General Dynamics F-16A		Withdrawn from use
and J-218 J-230, J-241 J-262			
A 246	Sud Alouette II		Withdrawn from use, 1998
and A 260 A-261 A-522			
282	Westland SH-14D Lynx		Crashed, 10 November 1998, De Kooy
Poland			
1308	Antonov An-26		Sold, 1998
1309	Antonov An-26		Sold, 1998
Slovakia			
2209	Antonov An-12BP		Withdrawn from use
1504	Let L-410UV		Withdrawn from use
and 1810 2006			

0420	Tupolev Tu-154B-2		Sold as RA-85842, May 1998
Spain			
E25-02	CASA 101 Aviojet		Crashed 9 September 1983
E25-30	CASA 101 Aviojet		Crashed, 31 October 1997, Alhama de Murcia
E25-42	CASA 101 Aviojet		Crashed 15 October 1993
03B 9	CASA 212S1 Aviocar		Crashed, 5 February 1998, Pinilla del Valle
XT12A-2	CASA 212 Aviocar		Crashed 12 March 1998, near Valladolid
TR12A-7	CASA 212B Aviocar		Withdrawn from use, January 1997
TE12B-42	CASA 212D Aviocar		Crashed 6 March 1991
VA 2 2	BAe/McD EAV 8B Harrier II		Crashed, 19 February 1998, Mediterranean Sea
Sweden			
88003	Swearingen Metro III (Tp 88)		Sold as SE LHM February 1998
Switzerland			
J 2326	Dassault Mirage IIIS		Withdrawn from use, 1998
and J-2329 J-2333			
J-5231	McD F-16D Hornet		Crashed 7 April 1998, Crans-Montana
Turkey			
23512	Boeing KC-135R Stratotanker		Returned to USAF, 1998
23568	Boeing KC-135R Stratotanker		Returned to USAF, 1998
030	Transall C-160D		Crashed 14 November 1998
USAF (UK)			
91-0327	McD F-15E Strike Eagle (91-0327)		Crashed 16 June 1998, Lakenheath
USAF (Europe)			
The 53rd FS at Spangdahlem disbanded early in 1999 with six F-15Cs and one F-15D joining the 493rd FS at Lakenheath. The rest have returned to the US.			
01081	Lockheed U-2S (FY80)		Returned to US, 1998
US Army (Europe)			
23373	Beech C-12D Super King Air (FY80)		Returned to US, 1998
and 40150 (FY84), 40151 (FY84) 40154 (FY84) 40316 (FY84)			
50151	Beech RC-12K Super King Air (FY85)		Crashed 6 November 1998, Erlach, Germany
23667	Sikorsky UH-60A Blackhawk (FY82)		Returned to US, 1998
and 23686 (FY82), 23722 (FY82) 23723 (FY82), 23730 (FY82) 24649 (FY87) 80240 (FY88)			
60199	MDH AH-64A Apache (FY88)		Crashed, 3 December 1997, near Bidingen
USAF (US based)			
40057	Rockwell B-1B Lancer (FY84)		Crashed, 18 February 1998, Mattoon, Kentucky
90268	Grumman C-20J Gullstream II (FY89)		Sold as N245GA, April 1998
84 825	Lockheed F-117A Nighthawk (84-0825)		Destroyed by fire 4 June 1997
01269	Lockheed C-130E Hercules (FY70)		Withdrawn from use, 1998
21819	Lockheed C-130E Hercules (FY62)		To AMARC, 15 May 1998
21822	Lockheed C-130E Hercules (FY62)		To AMARC, September 1997
21828	Lockheed C-130E Hercules (FY62)		To AMARC, 15 May 1998
43026	Lockheed C-130J Hercules II (FY84)		Re-serialised 68151, 1998
43027	Lockheed C-130J Hercules II (FY84)		Re-serialised 68152, 1998
10326	Boeing EC-135E (FY61)		To AMARC, 1 June 1998
12688	Boeing C-135C (FY81)		Withdrawn from use, December 1996
23581	Boeing EC-135C (FY62)		To AMARC, 1998
23582	Boeing EC-135C (FY62)		To AMARC, 1998
23585	Boeing EC-135C (FY62)		To AMARC, 2 June 1998
26000	Boeing C-137C (FY62)		Preserved, Wright-Patterson AFB, May 1998
38046	Boeing EC-135C (FY63)		To AMARC, 21 October 1998
38048	Boeing EC-135C (FY63)		To AMARC, 1998
38052	Boeing EC-135C (FY63)		To AMARC, 16 January 1998
38054	Boeing EC-135C (FY63)		To AMARC, 28 October 1998
56974	Boeing C-137C (FY85)		Withdrawn from use, 1998
86971	Boeing C-137B (FY58)		To AMARC, 8 October 1998
91452	Boeing KC-135E Stratotanker (FY59)		Crashed, 13 January 1999, Geilenkirchen, Germany
12776	Lockheed NC-141A Starlifter (FY61)		Withdrawn from use, June 1998
38086	Lockheed C-141B Starlifter (FY63)		To AMARC, 19 December 1997
50223	Lockheed C-141B Starlifter (FY65)		To AMARC, 1 October 1998
50227	Lockheed C-141B Starlifter (FY65)		To AMARC, 18 September 1998
50252	Lockheed C-141B Starlifter (FY65)		To AMARC, 22 December 1998
50272	Lockheed C-141B Starlifter (FY65)		To AMARC, 8 June 1998
50275	Lockheed C-141B Starlifter (FY65)		To AMARC, 17 December 1998
50277	Lockheed C-141B Starlifter (FY65)		Withdrawn from use at McChord AFB, 1997
59404	Lockheed C-141B Starlifter (FY65)		To AMARC, 9 December 1997
60128	Lockheed C-141B Starlifter (FY66)		To AMARC, 10 September 1998
60135	Lockheed C-141B Starlifter (FY66)		To AMARC, 22 December 1997
60172	Lockheed C-141B Starlifter (FY66)		To AMARC, 14 October 1998
60178	Lockheed C-141B Starlifter (FY66)		To AMARC, 16 December 1998
60200	Lockheed C-141B Starlifter (FY66)		To AMARC, 15 April 1998
60203	Lockheed C-141B Starlifter (FY66)		To AMARC, 30 December 1997
67958	Lockheed C-141B Starlifter (FY66)		To AMARC, 31 March 1998
70009	Lockheed C-141B Starlifter (FY67)		To AMARC, 29 July 1998
70164	Lockheed C-141B Starlifter (FY67)		To AMARC, 6 November 1998
USN (US Based)			
150520	Lockheed RP-3A Orion (39)		Withdrawn from use
151357	Lockheed TP-3A Orion (LL-26)		To AMARC, 11 August 1998
151379	Lockheed TP-3A Orion (LL-25)		To AMARC, 16 December 1997
152728	Lockheed P-3B Orion (728)		To AMARC, 17 March 1998
152745	Lockheed EP-3J Orion (LV-745)		Destroyed by fire 25 April 1998, NAS Brunswick
156512	Lockheed P-3C Orion		To AMARC, 1997
also 156513, 156526 158928 159883 159888 and 160289			
165153	Grumman C-20G Gullstream IV		Damaged beyond repair,

all systems...

It's time to go — the first and the most recently registered go Boeing 737-300s seen tail to tail on the Stansted Airport ramp between turn-arounds. Nearest the camera, Boeing 737-3Y0 G-IGOA was one of two B737s which inaugurated go's services on 22 May 1998. Beyond, Boeing 737-36N G-IGOJ carries the newest registration in the go fleet and is the first new-build aircraft in service, being delivered straight from Seattle on 30 November last year — the other seven are all, bar one, 1990-built models.



G-IGOJ

G-IGOA

In another *Aircraft Illustrated* 'first', MARK ASHLEY goes behind the scenes at go, the low-cost airline launched in a wave of controversy that has now won over its critics and established itself in a tough marketplace. All photographs by the author

We see ourselves as a modern European airline. We are marketing ourselves that way'. So says Captain Ed Winter, director and chief operating officer of go, the much talked-about, low-cost airline launched last May amid claim and counter-claim about its ownership and independence. Ed spoke to *Aircraft Illustrated* for an exclusive interview inside go's operating base at London Stansted Airport.

Rumours are still rife about the true nature of go's relationship with British Airways (BA). At least one rival airline has claimed that go benefits from having an unfair advantage over its competitors, alleging that BA's financial support gives it a protection and a resource which other low budget independents cannot have. go's counter-claims to the contrary are not helped by British Airways' own announcement published last year in its in-house newspaper, *BA News*, that it had launched a new airline. More recently, *Flight International* reported in a March 1999 issue that go was 'set up by British Airways last year'.

Ed has the opportunity in this interview to explain go's position, while at the same time describing how a new European airline with a British pedigree can get off the ground in

such a tough and crowded marketplace today. Away you go, Ed.

'We weren't set up by BA', he insisted during our interview. 'BA provide the capital, BA is the sole shareholder. BA owns go. But, in order to make this work, we decided right at the start we had to be very separate from BA. British Airways is fantastic at what it does, but what it does not do is a good low-cost airline.'

'That's not to say we didn't buy a number of services from BA during the start-up period. Anything we did buy from them, we did so by setting up a contract and buying at market rates, while comparing what BA provides with what anybody else could provide.'

'An example is the engineering', Ed elaborated. 'Everyone assumed we would go to BA for the engineering of our aircraft. But we gave BA the opportunity to bid, along with other people. At the end of the day we chose FLS Aerospace as being the right match in terms of price and quality, to provide our engineering. They have a large hangar here (at Stansted); that weighed very heavily in their favour, obviously, and they had the capacity to deal with us.'

'People shouldn't assume we go to BA for everything'.



Free to go — the message of Britain's newest and probably most controversial low-cost airline is clearly marked on the newest Boeing 737-300 to enter service, Model 36N G-IGQJ.

comfortable in a big airline with all sorts of opportunities, but the risk is they end up feeling they're just a number. Other people prefer to be in a small unit. The majority of people who've come to join us have done so because it's brand new, it's exciting, it's a chance to really make a difference.

'We're trying to be a very open airline'. That, by necessity as well as design, is true. *go's* staff, from chief executive officer (CEO) Barbara Cassani downwards, all occupy open architecture office floor space in Enterprise House, working very closely to and with each other. Ed pointed out that the whole of the operations department were mixed together in one section of the floor plan, with the chief engineer, cabin crew manager, ground services, head of operations and chief pilot all located in the same area. Aircrew check in for work in this section as well. The result of this familial-style closeness is that *go* staff have become far more integrated as a team, in a much shorter space of time, than might otherwise have been possible.

The choice of Stansted was important for the airline's base. 'We spent a long time deciding where our base would be. Clearly Gatwick and Heathrow were eliminated due to slot constraints. So, looking at London as our base, that left Luton or Stansted. We spent a lot of time talking to both airports and, taking a view on the pros and cons of both, we made a decision to come to Stansted. Infrastructure-wise, Stansted is great. It's got a superb runway, taxiways that go right to the end of the runway, and several cul-de-sacs (air terminal aprons)'. Luton, by comparison, was considered last year to be too constrained in apron-

space, explained Ed, although he acknowledged the expansion now taking place at that important provincial airport. The increased catchment area of the Home Counties and the Midlands was an important issue in Luton's favour for *go*, but Stansted's new Skytrain service straight from London's Liverpool Street Station every 15min was another decisive factor. 'When you get off the Skytrain in the air terminal and go up the escalator, there in front of you is the *go* Check-In! It's one of the best airports anywhere in terms of accessibility from rail to Check-In'.

AI: What size budget did *go* have to work with at start-up?

GO: 'We started our life in the UK, but that's more because of our parentage rather than the style we want to be. . . . If you look at our passenger mix and at our booking profile, you'll see we get a very large number of bookings from the other end of the route. That's very important to us. London is a big in-bound destination'.

go launched its inaugural scheduled service from Stansted to Rome Ciampino Airport on 22 May 1998, followed by Milan Malpensa Airport on 'Day 2'. The airline now serves eight European destinations, the other six being Bologna, Copenhagen, Edinburgh, Lisbon, Munich and Venice's Marco Polo Airport.

All seats are in a single class. Each *go* Boeing 737-300 is configured to a 148 passenger-load. Bookings are made direct through the airline's tele-sales operation in Enterprise House at Stansted Airport. Tele-sales is open every day of the week from 07.00hrs - 23.00hrs. Flights can also be bought at Stansted Airport itself up till one hour before departure, or through the airline's internet site. *go* is ticketless, the only document you need when flying with the airline is your passport.

According to Ed, *go* was set up and operating in record time from the day it got the word 'go'.

'The speed at which we set the airline up, I think we probably set some records. We were given board approval by British Airways in November 1997. At that time, Barbara Cassani, two other people and myself were all working for *go* part-time. I was still working as chief pilot on BA's Classics, Concorde and B777 — so I was running those fleets, and running this! From that point until 22 May 1998 we employed the management team, we leased aircraft, we employed pilots and cabin crew, we trained them, we set up a contract with the engineering company and with the ground services company (Servisair).

Captain Ed Winter (standing), chief operating officer of *go*, discusses the next scheduled movement with one of his operations staff at the airline's base in Enterprise House, within London Stansted Airport. It's been quite a change of role for Ed — he previously oversaw British Airways' Concorde and Boeing 747 Classic fleets.

'We moved into Enterprise House, got tele-sales going, we got a design for the aeroplanes (Wolff Olins, a design company in Kings Cross and the brains behind the Goldfish charge card image, created the *go* logo and colour schemes), we painted them, we advertised and we had customers — in that period of time! And all that was under our own AOC (Air Operator's Certificate).

'We made a decision very early on (to use our own AOC). We did look, early on, at going down the road that a lot of our competitors have done — piggy-backing on somebody else'.

Ed claims other low-cost airlines have contracted a separate operator to achieve their AOC standard in flying and maintaining their aircraft, while they concentrated initially on sales, advertising and passenger services. When their AOCs were granted by the Civil Aviation Authority (CAA), these new airlines then became responsible for all aspects of their operations.

'We were confident. We felt we could provide a far better product by actually doing the whole thing ourselves and going straight for our own AOC', Ed states.



go's tele-sales operation at Stansted, where bookings for airline services are received.

Rome and Milan were *go's* first destinations. With just two B737-300s in service on 22 May last year, Ed felt it was prudent to launch the Rome service alone on the first day, with one aircraft in reserve — just in case — before adding Milan on the second day of operations. Both Boeings flew these routes until a third aircraft arrived three weeks later.

'A *go* destination has to be one where low-cost services will generate an increase in the market. We're not looking to just go out on a route and pinch traffic from somewhere else. There's no future in doing that.

'What we're looking for is to go on a route whereby we can offer such good value, at such a low cost, that people will look at that and say, 'Yes, I'll travel with them to Rome'. We're looking at people who maybe currently travel once or twice a year. We can give them the accessibility, to allow them to fly three, four or five times a year, because now, through an airline like ours, they can afford it, it's easy and it's accessible. So we're looking for routes like this.

'Length of route? Much over three hours, people want a proper catering service — so that sets the distance. De-regulation gives us

the whole of the EEC. So, given those parameters, we can take a swathe through Portugal, Spain, Italy, France, Germany and up into Scandinavia.

'We did a fair amount of research, selecting a long list of routes and putting them into our business plan to see which ones would respond best to our formula, which of them had that elasticity to allow the market to grow with a low-cost carrier. Rome and Milan came out on our list as the most suitable destinations to start with.

'Our list of destinations we're looking at expands to the whole of Europe'.

Indeed CEO Barbara Cassani was recently reported as saying that *go* was examining the many cost and operational benefits of setting up 'mini-hubs' at a variety of European airports, especially at secondary, or 'tertiary' airports as she described them, which are not affected by slot restrictions. Other British-based low-cost airlines have already adopted this strategy. *go's* passenger mix was running at something like 80% visitors and 20% business traffic come late January. Ed acknowledges that business people will not choose a new low-cost airline until it can prove it runs on time, so that they can rely on it to help them meet their deadlines. The business sector is progressively growing, he reported, as it gains more confidence in *go's* services.

The airline's own survey into customer satisfaction, conducted in December, claims 91% of passengers were pleased with its services and would go with *go* again. A surprising 45% revealed that the new low-cost carrier provided their first flying experience.

Any routes the airline flies must sustain high capacity; *go* is not in the market of servicing certain destinations just once or twice a day. Turn-arounds of aircraft are achieved within 25min, compared with a 45min average for a B737-300 operating with a higher-cost airline. The big difference is the amount of meals and other services needed to be loaded onto aircraft flown by these other carriers, whereas *go's* stream-lined menu provided by Costa, the Italian coffee bar experts, cuts the loading time down drastically and ups the number of schedules to be flown.

Eight B737-300s were on strength with *go* at the time of *Aircraft Illustrated's* visit: the first six to be delivered in 1998 were all 1990 models, while the seventh — delivered on New Year's Eve — is the oldest in the fleet, having had its maiden flight on New Year's Day 1989. The first three are all ex-Philippine Airlines aircraft, whose leases were surrendered during the East Asian financial crisis. Of the others, one was formerly operated by Garuda Indonesia, two

AIRCRAFT FLEET

G-IGOA	B737-3Y0	Ex-PAL	Delivered 01/05/90
G-IGOC		Ex-PAL	Delivered 01/01/90
G-IGOE		Ex-PAL	Delivered 01/02/90
G-IGOF		Ex-Garuda	Delivered 01/04/90
G-IGOG		Ex-Air Liberte	Delivered 01/07/90
G-IGOH		Ex-Air Liberte	Delivered 01/06/90
G-IGOI		Ex-BMA	Delivered 01/07/89
G-IGQJ		Boeing	Delivered 01/10/98



Boeing 737-3Y0 G-IGOA was one of *go's* first two aircraft, which together flew the first services of Britain's newest low-cost airline on 22 May 1998.

more by French carrier Air Liberte, while the eldest came from British Midland.

Ed flew the airline's newest and eighth B737, a series 36N model, from Boeing's Seattle plant to Stansted on 1 October last year. Five more new-build B737-300s are to be delivered in 1999. At this time the airline is not looking at any other type.

All are leased aircraft, with leasing being 'the way to go for a new start-up, low-cost airline', claimed Ed. With the expansion of services and of the fleet, the airline may look at different acquisition plans within a five-year time frame.

'When we started up, we evaluated a number of aircraft types. We decided the capacity of the B737-300 was right for us. I don't really want to see us, in the near future, to go to anything bigger than that. The B737 is good on economics, it's good on quick turn-arounds — quick turn-arounds are vital to the whole economics of our operation. With the Airbus A319 you need a trolley to reach the hold, whereas you can reach a B737 hold very easily.

'On the other hand, the Airbus does have some advantages. At the time we set up, the A319 was not available to us — the only Airbus which was available was the A320, which was far too big.

'What is essential to us is that we maintain a common fleet, but at some point in the future we will be re-evaluating what we've got. Whether that happens when we start another base or run to the end of the leases with the B737s, remains to be seen. Clearly the A319 is a fine aeroplane and obviously a contender.

'At the end of the day, we're trying to provide at low cost the best value to our customer. We have to look at which aircraft, both in terms of its cost, its maintenance costs, and whether it will do the job for us. Touching on utilisation and turn-around, that is key to what we are doing'.

AI: Can *go* really rid itself of the BA linkage in people's minds?

GO: 'Yes, definitely, even more so in the future', Ed asserts. 'As we started a lot of the publicity, and even the advertising, talked about the new low-cost airline from British Airways — the link with British Airways. The fact other airlines are accusing us of being subsidised by British Airways links us with BA at the moment. But, as we are very rapidly developing our own place within the market, people will recognise who we are. They will come back and fly with us again. People will know what we are'.

AI: Where does *go* get its pilots?

GO: 'They're a real mixture. They range from a group of ex-BA pilots. BA pilots retire at age 55, whereas we can fly them until they are aged 60 anywhere in Europe — 63 years, if we fly them to Spain, Portugal, Italy and France. We've got eight (retired BA pilots) at the moment, with another three on their way, who generally work half-time. It's fine for them, it keeps them in touch with aviation. From my point of view, it's a core of good experience within the airline: these are all people with 30-plus years in flying, they're all from a background I'm familiar with in British Airways. I know the standard'.

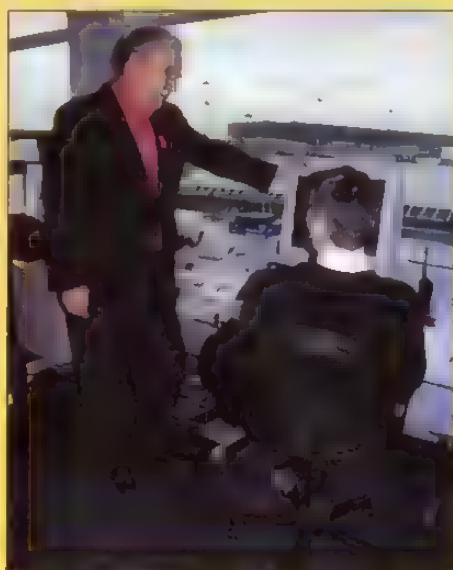
Ed should indeed know the standard. He was chief pilot on British Airways' Concorde, Boeing 777 and Boeing 747 Classic fleets, a job he was still doing when he was recruited to become chief operating officer of *go*.

'The rest of the pilots come from almost any airline you like to name: quite a few come from Ryanair, British Midland, easyJet; some from abroad, such as Cathay, Air Macau and Ansett. A wide range.

'We recruit anybody who's got a JAA licence and who's acceptable to the CAA', he added, in response to a question about whether *go* hires pilots from European countries in which the airline has destinations. 'We've got two Norwegians, a French guy, a Portuguese pilot. *go* is a very European airline', Ed again emphasised.

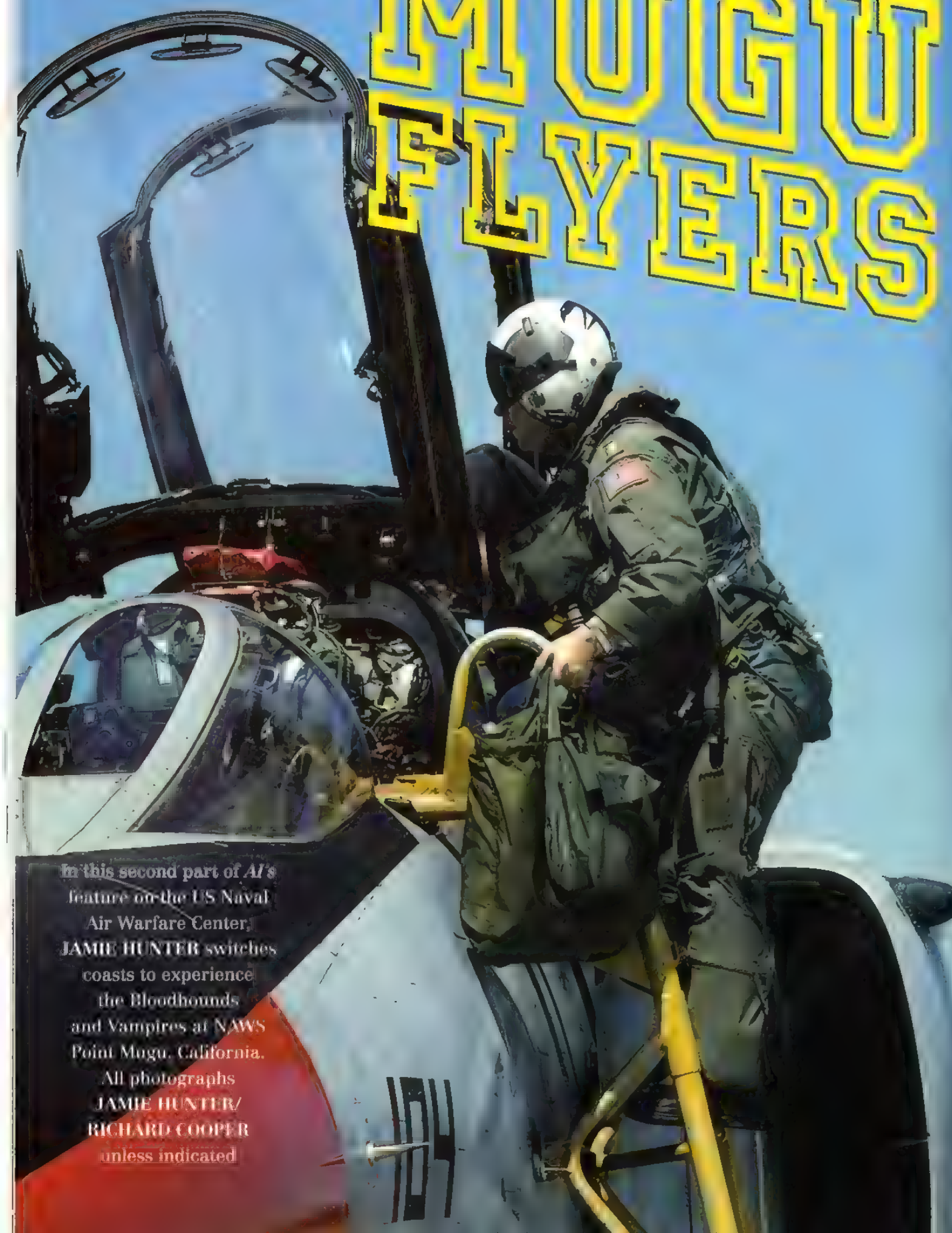
AI: Is there a tendency within the airline pilot community to view flying for a low-cost carrier as down market? Could a Captain at *go* risk losing status among the 'Nigels'?

GO: 'I don't think so', refutes Ed. 'I've got a range of people flying for me, they're all very high quality, highly motivated. I think the people in the pilot profession choose where they want to go. Some people will feel more



Chief Phantom pilot Lt-Cdr Chip 'Shantini' Shanle climbs on board his QF-4 at Pt Mugu. Despite their age, the QF-4s of the resident 'Bloodhounds' continue to perform many vital missions in support of the US Navy's test and evaluation programmes.

MUGU FLYERS



In this second part of AI's feature on the US Naval Air Warfare Center, JAMIE HUNTER switches coasts to experience the Bloodhounds and Vampires at NAWC Point Mugu, California.

All photographs JAMIE HUNTER/RICHARD COOPER unless indicated

The multitude of aircraft types that operate from US military air bases and aircraft carriers around the world employ a diverse array of high technology air launched missiles, bombs and cannons as well as the associated hardware and software. If a military aviation programme is to be fielded by the US Navy, the technology invested within it will be subjected to rigorous scrutiny thus ensuring that when the time comes, the Naval aviator will not even have to contemplate failure. The task of testing and evaluating this equipment, and interfacing with the manufacturers, is in the hands of the elite test squadrons which collectively form the impressive Naval Air Warfare Center.

The United States Naval Air Warfare Center (NAWC) is tasked with research, development, test and evaluation primarily in support of the US Naval fleet. It follows that the NAWC has to be versatile and able to fulfil a multitude of diverse and challenging programmes assigned by their overseeing directorate, Naval Air Systems Command (NAVAIR). The NAWC is working hard to maintain its technological status despite ever shrinking budgets.

With its roots stemming from the old Naval Air Test Center (NATC) divisions, the current organisation is a streamlined body which applies synergistic use of assets to safely and efficiently fulfil its many goals. These assets are located at some of the most advanced military facilities in the world, utilising vast



Above: NAWC Point Mugu, California. US Navy



Left: Rows of 'day-glo' orange target tugs on the Pt Mugu ramps during November 1970. US Navy

weapons ranges, extensive laboratories and varied test aircraft crammed with sensors and new equipment, all under the control of leading test pilots and scientists and augmented by extensive ground support. Every test flight is backed

up by evaluative simulator time and preparation to ensure that every minute of every mission is as productive as possible.

The NAWC is split into two main groups, the renowned Aircraft Division (NAWC-AD) based at Naval Air Station Patuxent River, Maryland (detailed last month), and the lesser known Weapons Divisions (NAWC-WD) primarily based at Naval Air Weapons Station China Lake, California, and Naval Air Weapons Station Point Mugu, California.



Known as 'Vandy 1', this incredible all-gloss black F-14 Tomcat is the pride of VX-9 'Vampires' and indeed the US Navy. It is shown during a weapon release trial firing an AIM-7 Sparrow air-to-air missile. US Navy

SUPPORTING THE WARFIGHTER

Headquartered at Naval Air Warfare Station China Lake, the Naval Air Warfare Center's Weapons Division

undoubtedly the most awesome concentration of military technology in a... Electronic Warfare and delivery ranges over both land and sea are pushed by advanced munitions dedicated to ensuring that the US Navy and Marine Corps stay at the cutting edge of military might. The Naval Air Warfare Stations at China Lake and Point Mugu have very unique and important roles in support of the US military's front line. The umbrella of the Weapons Division incorporates a plethora of activities, mostly carried out by the test squadrons of this Naval branch: the Naval Weapons Test Squadron Point Mugu known as the 'Bloodhounds' and the Naval Weapons Test Squadron China Lake, the 'Dust Devils'. Operational evaluation is carried out by fleet aviators assigned to Air Test and Evaluation Squadron Nine (VX-9) the 'Vampires', the latter two units being covered in a future issue



Cruising the Pacific Coast Highway north-bound out of Los Angeles, the road rounds the headlands and skirts the famous surfing beaches of southern California. Atop the rising headland, some 45 miles north of Santa Monica, the radio masts and dishes indicate the proximity of a military installation, and as the dramatic pole-mounted F-4 Phantom and F-14 Tomcat gate guards come into view, it becomes apparent you have arrived at the Naval Air Weapons Station Point Mugu.

The Naval Air Warfare Center's Weapons Division at Point Mugu nestles on the Pacific coast and enjoys a unique status within the United States Navy. The Naval Weapons Test Squadron Point Mugu, better known as the 'Bloodhounds', are the guardians of the Pacific Missile Test Range, and fly a diversity of missions from here fulfilling a vital role for the US Naval Fleet mainly by conducting operational weapons research, development and evaluation as well as



The old ones are the best! Scenes from Point Mugu past with TA-7C pictured in mid-1993 and QF-4 'Great Pumpkin' caught on the ramp in November 1976. Vance Vasquez

forged here and acceptance trials of the jet and its systems were concentrated at Point Mugu until fleet service in 1973. However, as

training and support as tasked by the Naval Air Systems Command (NAVAIR). This involves both military and civilian personnel working with manufacturers to ensure that the US Navy gets the right product for the right mission.

On first impression, the flightlines and hangars at Point Mugu look the same as any standard CONUS Naval Air Station and the relaxed Californian atmosphere could belie the intensity of operations here — not to mention some of the aviation gems that grace the sun-kissed ramps.

Point Mugu's embryonic testing stage dates back to January 1945 when the Loon surface-to-surface missile was evaluated as a potential ship-to-shore weapon. This led to the facility being considered as a Naval Air Special Missile Test Center and by 1949 Point Mugu was designated as a Naval Air Station and the home of the Naval Air Missile Test Center. The first stand-off air-to-surface missile, the radio-guided Bullpup, was trialled at Point Mugu in 1958, as was the now-famous AIM-7 Sparrow. An appropriate Naval environment was established on 16 June 1958 as the Pacific Missile Range came into being and was linked via flight corridors to similar facilities at China Lake, California, and White Sands, New Mexico. The new range network paved the way for Intercontinental Ballistic Missile trials as these could now be fired at sea and impacted on a land range benefiting from the exotic telemetry systems now in-theatre. As the Cold War gathered pace, the facilities at Point Mugu and sister station China Lake in the Mojave Desert followed suit. By the early 1990s, the Naval Air Missile Test Center had become the Pacific Missile Test Center (PMTTC) and could boast a wealth of historic military milestones. Indeed, mention any weapons system in Naval aviation service and you can bet that Point Mugu had some involvement along the line. The partnership of the F-14 Tomcat's AWG-9 radar and its unique AIM-54 Phoenix missile was



spent much of his Naval career flying the A-7 Corsair. After commanding the Naval Weapons Test Squadron at China Lake he moved on to Point Mugu and the challenges of a unique squadron. Earlier this year, Capt Kennedy handed over the reigns of the unit to Cdr Alexander Hnarakis.

The aviators at Point Mugu class themselves as having one of the finest jobs in the Navy, and on analysis it is easy to see why. The flightlines at Point Mugu are starting to increase in activity, mainly due to the newly arrived E-2 Hawkeyes transferred from Miramar, but the base has always harboured rarer Naval types and boasted exciting flying and continues to do so today. The venerable A-3 Skywarriors and A-7 Corsairs solidified on here with VAQ-34 'Flashbacks' until the unit moved to NAS Lemoore and upgraded to F/A-18s before disbanding. The last US Navy Corsairs, the EA-7Ls (formerly

Left: Arguably one of the most exciting units in the US Navy, the Naval Weapons Test Squadron Point Mugu — the 'Bloodhounds', is the last operator of the F-4 within the service, albeit in a drone capacity.

Below: The 'Bloodhounds' QF-4s are a valuable asset to the US Navy. Although most will end their days at the sharp end of the latest air-to-air missile development, the aircraft perform test duties in their own right and in some cases are the only aircraft capable of doing so.



with VAQ-34), were operated by the 'Bloodhounds' until November 1994. These 'Cadillacs' fulfilled Tomahawk cruise missile photo-chase duties as well as 'buddy' in-flight refuelling trials. With the squadron having lost its small resident A-6 Intruder and F/A-18 Hornet fleet to China Lake in consolidation moves in 1995, the unit concentrated on the F-14 Tomcat and P-3 Orion as its only operational fleet aircraft types. The Tomcats at Point Mugu range from early NF-14A variants up to the formidable 'D' Super Tomcat. All of the squadron's aircraft are fitted with the latest systems that are under development or consideration for the front line units, making them benchmark examples in terms of effectiveness. As well as these modifications, the jets all incorporate video or still cameras for store separation recording, and highly instrumented data recorders to ensure that every valuable minute of each mission is available for close scrutiny by the analysts back at base. The five NP-3D Orions on strength collect range mission data by datalink and the 'Cast Glance' optical data gathering system, not only for air-launched missiles but also for ships in the Pacific range engaged in similar duties. The unique 'Billboard' antenna that is grafted onto the leading edge of the fin of these aircraft is a phased

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Above: As if an operational US Navy Phantom needed to be made any more impressive?

Above left: One particularly striking Phantom on the unit's current strength is this all-white YF-4J nicknamed 'The Ghost'. This jet has recently been deployed to China Lake working on a NASA-funded parachute extraction system using a conical canopy as well as Super Hornet ejection seat trials. Airshots

Centre left: A QF-4 taxis back to the 'Bloodhounds' active ramp with its drag chute still deployed. Airshots

Left: QF-4 152970 blasts out of Point Mugu at the start of another test mission.

the BQM-34 Firebee target drones are either ground launched or dropped from DC-130A Hercules.

The Phantoms selected for drone conversion are drawn from airframes held at the AMARC facility at Davis Monthan AFB, Arizona. The aircraft are all ex-US Navy or Marine Corps examples, with the first variants to be converted being F-4Ns with later and more-advanced drones being the F-4S. The Naval Air Depot at Cherry Point, North Carolina, takes the basic airframe and modifies the internal avionics fit to incorporate the NOLO (No On-board Live Operator) remote control system and, depending on the life expectancy of the jet, incorporates relevant amounts of specialist test equipment mountings facilitating retrofit once at Point Mugu. The US Navy's QF-4s were to have been produced alongside the US Air Force examples by Tracor Flight Systems at Mojave, but differences in inter-service priorities eventually led to separate programmes. However, with the Navy machines netting many Air Force projects, most recently F-22 Raptor's AMRAAM clearance trials, they claim the upper hand. With only a handful of QF-4Ns remaining, the ramps at Point Mugu are seeing more of the new QF-4S-PLUS versions which incorporate new Electronic Warfare (EW) suites and Trimble GPS (Global Positioning System).

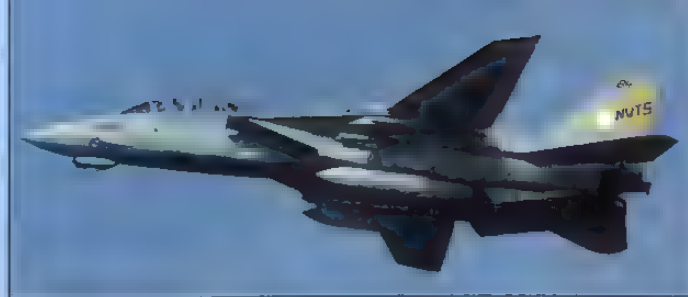
The basic 'S' airframe isn't quite as popular as the 'N' as a 'Bloodhound' pilot, as Capt Kennedy explained. 'The Navy didn't incorporate the role augmentation into the 'S' model and if you're not careful it can play up on you. The more you hang on the jet the worse it gets. In the pattern, an F-4S with one fuel tank on the centreline is not too bad. Its like having one kid — you can keep an eye on it and keep it in check. But now hang more tanks on and it's like having three kids — you let your attention slack for a second and it can really mess things up. You've really got your work cut out, so you've got to stay on top of things all the time'.

The Phantoms at Point Mugu are vital to the Navy and are kept extremely busy as Capt Kennedy highlighted. 'The QF-4 is a valuable training aid for the ships working up in the Pacific, we can jam their systems, and fly dynamic high performance profiles to present a full-blown air raid or simulate an incoming missile. We qualify ships and their crews in defensive tests and they find the QF-4 a real handful.'

BLACK IS BEAUTIFUL

The stunning 'Vandy 1' of VX-9 'Vampires' banks into the blue with its wings at full sweep for the camera of Rick Lilnaree/Dash 2 Aviation Photography





Above left: The commanding officer of the Naval Test Wing Pacific leaves Point Mugu on board NF-14D 163416/200, complete with 'high-viz' markings. Airshots

Above right: The latest addition to the vast Point Mugu ramps is the E-2 Hawkeye, with the units now having transferred from MCAS Miramar. Airshots

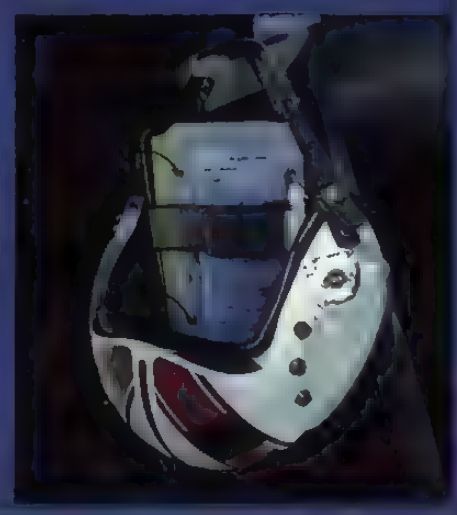
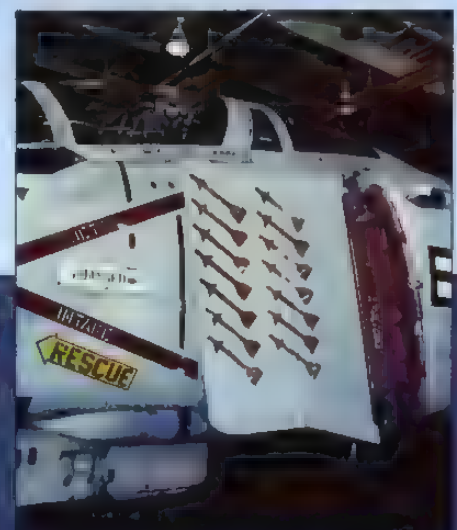
Right: The five NP-3D Orions on strength are used to collect range mission data by datalink and the 'Cast Glance' optical data gathering system. The unique 'Billboard' antenna grafted onto the leading edge of the fin is a phased array telemetry antenna optimised for tracking the particular munition under test. US Navy

Left: One of the NWTS NP-3Ds awaiting its next long-endurance data gathering mission, while the row of 'Bloodhound' QF-4s can be seen in the background.



the NP-3Ds means that a regular mission is to perform safety tasks in the Pacific Missile Test Range, ensuring that the range is clear of erring vessels during activity.

Some of the 'Bloodhound' F-14 crews were recently called to the Persian Gulf to test some new systems 'in theatre' when tensions were running high, illustrating how the squadron must be available to answer any need from the fleet at any time



'PHINER POINTS'
Mission marks showing how evasive an F-4 can be from an incoming missile, with a 'Bloodhound' bone dome' awaiting its owner. Also shown is the additional NOLO panel added to the QF-4N allowing the aircraft to fly with 'No Live Operator'



Further enhancing the ships' awareness to threats, the Phantoms here are now firing the Russian-built MA-31 high-speed aerial target based on the country's Kh-31 anti-radar and anti-ship missile. The Phantom is the only aircraft in the Navy's inventory cleared to fire this missile from a special trapeze-style pylon on the centreline. Similarly, the QF-4 is the only jet suitable for firing the Navy's AQM-37 high-speed target missile. The missile's parameters mean that a high-altitude and preferably supersonic launch profile is essential, for which only the venerable Phantom will suffice.

The Test Squadron is a versatile entity and the QF-4 mirrors this flexibility making it the perfect test aircraft. The jets do venture away from Point Mugu in support of major US Naval exercises such as 'RimPac' which involves a deployment to Hickam, Hawaii, or more usually a trial at sister station China Lake. The partnership of the two stations is particularly apparent when tasked with long range stand-off missile testing. The 'Dust Devils' Hornets have frequently been firing SLAM-ER (Stand-Off Land Attack Missile-Expanded Response) off in the Pacific Ranges, with a QF-4 then chasing the missile through a restricted corridor up to impact up at China Lake.

The Tomahawk cruise missile test missions are also extremely challenging as Capt Kennedy explained. 'Once the Tomahawk comes out of the tube on the ship we chase after it in four QF-4s. We can then take over control manually from the back seat of the Phantom and test the particular system we are interested in. We escort the missile in 30ft separation visual formation on a restricted test route up to the Electronic Combat Range at China Lake, it is then sub-



MODIFIED AT MUGU

Any C-130s seen operating out of Point Mugu are likely to be highly colourful and modified for specific roles other than transport. The examples shown here are a LC-130 from VXE-6, more used to operating on the icy tundra of the Arctic, and a DC-130 used for launching the US Navy unmanned drone programmes. Airshots



INTERVIEW WITH A VAMPIRE

Air Test and Evaluation Squadron Nine, which bears the Naval abbreviation AIRTEVRON Nine or VX-9, was born out of the amalgamation of two squadrons committed to operational test and evaluation of air launched weapons. When it was decided to merge VX-4 'Evaluators' from Point Mugu and VX-5 'Vampires' from China Lake in 1993, it followed that the new unit would become VX-9 and assume the callsign 'Vampires'.

Today, the 'Vampires' fly a vital but somewhat reduced mission. At China Lake (the headquarters for the unit) VX-9 fly the F/A-18 Hornet, AV-8B Harrier, EA-6B Prowler and AH-1W SuperCobra. At Point Mugu under the designation VX-9 Det Point Mugu, the unit concentrates on all F-14 Tomcat assignments. Second in command Lt-Cdr Steve 'Lenny' Leslie explained: 'We took over where VX-4 left off. We conduct all operational testing for the Tomcat's air-to-ground mission as well as most of the air-to-air work. Initially we get issued a mission statement which will basically outline a new system, so we go and evaluate its usefulness for the fleet. We decide how the squadrons will use it, check it out in all weathers; does it suit deck operations? Does salt spray have an adverse affect? Is it easy to maintain? Can we really mess it up? — Basically, does it serve its purpose?' It is regular practice for the unit to deploy with a carrier air group for these trials and the interaction with the front-line units is very much what

the 'Vampires' mission is all about. Once the groundwork is complete, if the programme is successful the staff at the squadron write reports, draw up tactics and write manuals for the fleet to use. However, if a project fails to satisfy the team it has the power to say to Naval Air Systems Command, 'no we don't recommend this for introduction, either don't buy it or refine it.'

The unit tries to fly its missions as a fleet pilot would, thus enabling the unit to realise any problems before the crews are out in theatre. For this, most of the pilots on strength are regular fleet aviators and the VX-9 tour is the same as any other squadron posting. The Point Mugu Tomcat team have been heavily involved with clearing the new attack profiles for the F-14 but as Lt-Cdr Leslie explains it was not completely new territory for the 'Big

Cat'. 'The F-14 was originally designed to have an air-to-ground capability but as the jet assumed its fleet defence role, the A-6 became the Navy's prime attack platform. As the A-6 disappeared, the Tomcat was in danger of becoming a victim to the Hornet so to keep the Tomcat viable within the fleet its multi-role talents needed unearthing. Once initial trials were completed at Pax River, we interfaced with the Intruder and Hornet community and adapted their tactics to make the Tomcat as potent as it is now in its multi-role capacity. The necessity for Smart Bomb incorporation led to us working with F-18s and F-111s for their laser guidance abilities, that was until we incorporated the LANTIRN targeting pod onto the jet'.

The unit is currently investigating 'BDMIX' which would see front-line units flying the 'B' and 'D' Tomcats mixed within a squadron to give a diversity in squadron abilities, so each could be interceptors and attackers as well as being TARPS (Tactical Airborne Reconnaissance Pod System) capable. The TARPS system itself is also under scrutiny with a digital evolution under analysis at present. This involves computerised download in place of the previous cameras with traditional film, and is relayed in real time to a land base. The system was recently taken on cruise with VF-32 'Swordsmen' for further operational trials that VX-9 allocated to them to further interpret its effectiveness in the hands of an operational unit.



Aircraft assigned to VX-9 'Vampires' for operational evaluation duties are split between the NAWC stations of China Lake and Point Mugu. Point Mugu boasts all of the F-14 complement, while examples of the other US Navy and Marine Corps' types are stationed at VX-9's China Lake facility. Airshots

Acknowledgements: For their valuable help in preparation of this article the author would like to thank, Capt (Ret) Dave Kennedy, Cdr Dane Swanson, Lt-Cdr Steve Leslie, Vance Vasquez, and all the staff at CinFO Washington.

In a remote part of Canada, the World's last airworthy Bristol Freighter still earns its keep, flying the 'gold mine' trail. But while the Freighter might be the 'nugget' of the Hawkair fleet, it has an illustrious colleague in the shape of the most famous nose job in the business, a Carvair. STEFANO PAGIOLA reports from Canada on the '24-carat' operations of Hawkair. All photographs by the author

Hawkair's Bristol 170 Freighter, C-GYQS, in flight over some of British Columbia's spectacular but forbidding scenery. Hawkair only undertakes flights in visual flight conditions.



GOING FOR GOLD

In the 1950s, Bristol 170 Freighters were regular sights in the skies over the English Channel, as they plied the car ferry routes between Lydd and Le Touquet. Come the 'swinging sixties', they were joined by Aviation Traders' Carvair conversion of the DC-4. Competition from sea ferries eventually put an end to these operations and both types vanished from British skies. Decades later, the world's last operational Bristol 170 is once again operating alongside a Carvair. The setting is no longer southern England, however, but northern British Columbia, and the name on the side of the aircraft now reads Hawkair rather than Silver City or British United Air Ferries.

Hawkair Aviation was formed in 1993 by four former employees of defunct Trans-Provincial Airlines — pilots Dave Menzies and Rod Hayward, and engineers Paul Hawkins and Don Vienneau. All four had been employed in Trans-Provincial's 'heavy aircraft' division, which had operated Bristol Freighters on cargo flights to gold mines in northern British Columbia. The group bid for the remnants of Trans-Provincial's Freighter fleet, which included two airworthy airframes and one grounded example. However, their bid was rejected by Trans-Provincial's receivers, who instead sold the aircraft to a consortium of British Airways pilots and engineers. This consortium contracted Hawkair to prepare the aircraft for their ferry flight to the United Kingdom. Hawkair thus began life as an Approved Maintenance Organisation. Like Trans-Provincial's heavy aircraft division before them, Hawkair made its base at Terrace, about 430nm (800km) north of Vancouver.

Hawkair soon moved beyond maintenance. While preparing one Freighter for its flight to the United Kingdom, it leased the other airworthy example, C-FTPA, and began operating it on mining contracts. The first revenue flights were operated in the late spring of 1994. Running an airline proved a lot more difficult than any of the partners had anticipated, however. Contracts proved hard to obtain, and crisis seemed to follow crisis. Eventually, Don Vienneau decided to call it quits. Disheartened, the three remaining partners were also about to give up. They had, in fact, returned their operating certificate to Transport Canada when they were awarded a major contract to fly equipment out of a closed gold mine at Windy Craggy during the summer of 1995. A rather puzzled Transport Canada official was persuaded to return Hawkair its certificate, and operations resumed.

The Windy Craggy contract proved to be the turning point for Hawkair. Environmental regulations required that all the mine's equipment be dismantled and flown out, along with considerable quantities of accumulated waste materials. The Bristol Freighter's large nose loading doors and capacious hold proved admirably suited to this task. The Windy Craggy contract was followed by work at the Snip gold mine at Bronson Creek, flying fuel



Above: Hawkair's Bristol 170 Freighter at rest at the company's Terrace base. The Freighter's grey livery was based on two practical considerations. First, the colour wears well in the difficult operating conditions that Hawkair faces and second, there was a special offer on that shade at the local vendor when Hawkair went shopping. Paul Hawkins' wife applied the paint using domestic rollers.

into the mine and gold concentrate out. Impressed with Hawkair's service, Bronson Creek's manager offered the airline a three-year contract in December 1996.

In order to cover the Bronson Creek contract, Hawkair began looking for additional capacity. On the one hand, it began restoring the third ex-Trans-Provincial Freighter, C-GYQS, which was in storage at Terrace. Hawkair had received this aircraft in payment for the maintenance work it had performed on behalf of the British consortium. Paul Hawkins went on a worldwide search for parts, eventually locating some in New Zealand and others in the UK. At the same time, Dave Menzies was looking for a DC-4 to supplement the Bristols. What he ended up coming home with, though, was a Carvair. Although more expensive than a 'straight' DC-4, the Carvair offered the same straight-in loading that had already proved so advantageous on the Bristol Freighter.

Just when everything seemed to be falling into place, however, disaster struck. On 24 April, Hawkair's leased Bristol Freighter was landing at Bronson Creek with a load of diesel fuel when the landing gear collapsed, sending it spinning off the runway. Although the crew escaped unscathed, the Freighter was completely destroyed. Suddenly, Hawkair found itself bereft of aircraft — and hence without income — just as the training and certification expenses of the Carvair were coming due and the repair bills on Freighter 'YQS' were mounting. Paul Hawkins had to take out a mortgage on his home to tide the airline over.

The Carvair arrived in Canada in early June, and after a period of crew training, began flying the Bronson Creek supply runs. This Carvair was the penultimate aircraft modified by Aviation Traders, one of three ordered by Australian airline Ansett. Withdrawn from use in 1974, it made its way to New Zealand in 1978 after a brief stint in Indonesia. In New Zealand it was briefly operated by Nationwide Air, but then entered a long period of storage following that airline's shutdown. Honolulu-based Hawaii Pacific acquired it in 1990, but this airline also proved short-lived, and once again the aircraft was placed in storage. Eventually, it was acquired by South African-based broker Airline Marketing Consultants, which had it ferried to Griffin,

Georgia, for overhaul by Carvair operator Academy Airlines. It was here that Hawkair found and bought it.

The early days of the Carvair's service with Hawkair proved troublesome. Now that it was once again working for a living, a succession of aches and pains came to the surface. Hawkair had to replace seven engines in as many months. In desperation, Hawkair even tried calling in a priest to bless the aircraft. Whether it was divine intervention or the attentions of Hawkair's engineers, the Carvair's problems were gradually ironed out. Rod Hayward, who had just returned from a leave of absence, put his new engineering degree from the British Columbia Institute of Technology to good use when he traced a particularly perplexing series of problems to a wobbly prop.

Meanwhile, the rebuild of 'YQS' continued apace, aided by the availability of parts salvaged from the unfortunate TPA. Built in 1952, this Mk31M had served for several decades with the Royal New Zealand Air Force, seeing service in Vietnam. It had then been sold to New Zealand-based Freighter specialist Dwen Airmotive. During the 1980s, it was operated by Instone Airlines as G-AMLK and by Hercules Airlines as ZK-EPD. In 1989, it became the first Freighter acquired by Trans-Provincial, as C-GYQS, arriving in Canada in October 1987. Its service with Trans-Provincial proved brief, however, since it was grounded following a landing accident at Windy Craggy on 20 June 1989. Since then, it had remained parked at Terrace, its former Hercules Airlines livery gradually peeling away to reveal the RNZAF camouflage scheme beneath. The rebuild of 'YQS' was a family effort, with Paul Hawkins directing the mechanical work while his wife used rollers to apply a new coat of paint — no mean task, given the immense expanse of the Bristol's airframe. 'YQS' finally took to the air again and soon thereafter headed north to join the Carvair at Bronson Creek.

BRONSON CREEK

Hawkair's main customer is the Prime Resources Corporation, which operates the Snip gold mine at Bronson Creek. The mine is served by a 5,000ft gravel airstrip. Its short length, combined with its position in a narrow river valley, makes it a very difficult

strip to operate into. Because of the mountainous terrain, it is common for wind direction and strength to differ markedly from one end of the runway to the other.

The main inbound cargo is diesel fuel. To carry it, a 1,600 gallon (6,056 litre) capacity tank is installed in the Bristol Freighter, secured to the cargo floor in the middle of the fuselage. The Carvair is similarly fitted with a 2,000 US gallon (7,570 litre) tank. Outbound cargo consists primarily of the gold mine's output. This takes the form of a concentrate that must be further processed to extract the actual gold. The concentrate is packed in 3,000lb (1,362kg) bags. The Bristol typically carries two of the bags in the front fuselage and one in the aft fuselage, while the Carvair usually carries five bags. In principle, the Carvair could carry as many as nine of the bags, but this would make the aircraft overweight on arrival — the Carvair's maximum landing weight is lower than its maximum take-off weight, and the flights from Bronson are too short for enough fuel to be burnt off to make up the difference.

The primary destination for flights to and from Bronson Creek is the Alaskan port of Wrangell, which lies about 50nm (90km) to the west. The flights typically take about 25 to 30 minutes, and are usually made at an altitude of about 2,000ft, following the course of the Stikine River valley to the coast. Flights are only operated under visual flight rules. Although the Carvair is certificated for IFR operations, it cannot be flown in icing conditions. With its thick wings and bulbous nose, the Freighter is also a veritable 'ice magnet'. As a result, flying is often intermittent, with many days of enforced inactivity followed by a flurry of activity as backlogs are cleared. When weather conditions are favourable, as many as five or six roundtrips can be made between Wrangell and Bronson Creek. The aircraft usually overnight at Bronson Creek, so that they can be loaded in the evening, ready for an early morning departure the following day.

Depending on the volume of concentrate to be flown out, Hawkair positions either one or both of its aircraft at Bronson Creek. The Freighter typically operates with a crew of three, including the two pilots and a loadmaster, while the Carvair is usually accompanied by a crew of five, comprising two pilots, a licensed mechanic, an apprentice, and a helper. Crews are typically rotated every 10-14 days, although weather conditions or mechanical problems sometimes lead to longer 'tours of duty'. Hawkair has five pilots on its rolls, all but one rated to fly both the Freighter and the Carvair. Additional pilots are brought in as needed on short-term contracts, although it is often difficult to find pilots with the necessary qualifications. Unlike many other countries, Canada requires a specific type rating for the Carvair rather than treating it as a version of the DC-4. Since Transport Canada no longer has personnel qualified on either of Hawkair's unique types, Hawkair's chief



Left: The word cavernous could have been coined to describe the Bristol Freighter's hold, seen here looking forward towards the nose doors. The low sill height and the hold's heavy-duty rollers allow easy loading of cargo.



Below left: Hawkair's Carvair, C-GAAH, seen in front of the company's hangar at Terrace. The Carvair's livery is basically that of the previous operator, Honolulu-based Hawaii Pacific Air, with the addition of the British Columbia crest. The airline's name is spelt wrongly (it should be one word) but correcting the error is low on the list of priorities. The Carvair was specifically designed to supplement and replace the Bristol 170 on car ferry routes. Almost 40 years later, a Carvair is once again supplementing, and eventually replacing, a Bristol 170.



Bottom left: Ironically for a propliner, the flying career of the world's last operational Bristol 170 is likely to be cut short by a lack of propellers. The Freighter's propellers are time-limited to 3,000 hours, and C-GYQS is currently using the last two such propellers with time left. One was obtained from a Freighter displayed in a museum in Winnipeg; the other was built up from individual blades obtained from former Bristol Freighter operator SAFE Air.

pilot, Dave Menzies, has been authorised to act as check pilot for its crews.

When not operating from Bronson Creek, Hawkair's aircraft are available for ad hoc cargo charters. These generally consist of supply runs in support of the mining and forestry industries, sometimes taking the form of single trips, but more commonly a series of trips during a specified period. During the winter of 1997/98, the Bristol Freighter was positioned to Thomson, Manitoba, for a month. In that year's mild winter, the ice roads used to supply native communities failed to form. A small-scale version of the Berlin airlift was organised to bring in supplies to these isolated communities. The Freighter's 12,000lb (5,448kg) payload and ability to fly into small airstrips proved a welcome addition to the effort.

THE FUTURE

Prime Resources has already announced that it will be closing down the Snip mine within a year. When this happens, Hawkair will have to find a replacement for its main source of revenue. It is entirely possible that the mine itself will continue to provide income even after shutting down — at least for some time — since Hawkair's aircraft are uniquely suited to help fly out the mine's bulkier equipment.

A more pressing concern is the future of Hawkair's fleet. The Carvair is now operating smoothly, its early problems having been resolved. During a five-week period in October 1997, for example, the Carvair operated

no less than 180 flights between Wrangell and Bronson Creek with just a single mechanical problem (a faulty prop governor), and even that was easily-rectified. While the Carvair looks set for a long operational life, the Bristol Freighter's days are numbered. Ironically, it is neither the lower spar nor the engines — traditional Bristol Freighter problems — that threaten to bring 'YQS's career to an end. Although the lower spar on Freighters needs to be replaced every 25,000 landings, the spar on 'YQS' is good for another 8,000 or so landings. Availability of parts for the Freighter's Bristol Hercules 734 engines has been another source of concern. Working with Aviation Jersey, the company which has engineering responsibility for piston Rolls-Royce and Bristol aero engines, Hawkair has developed a way to fit Hercules 734 blower/gearbox assemblies to the more common Hercules 264 engines. However, those engines will be of little use without propellers and Hawkair is currently using the last two extant Freighter propellers. Even this pair took considerable effort to locate, with one being built up from spare blades Paul Hawkins uncovered in New Zealand, and the other removed from a Freighter in a museum in Winnipeg, in exchange for a time-expired Hawkair prop. Each propeller is limited to 3,000 hours, meaning that unless additional propellers can be found, the Bristol Freighter has only about 1,000 hours of flying time left. At the current rate of about 100 hours a month, this limit is likely to be reached in the autumn of 1999. Hawkair is thus actively considering its options for the future.

Acknowledgements: The author would like to thank Paul Hawkins, Rod Hayward, and Dave Menzies of Hawkair Aviation and Henry Tenby of Western Express Airlines for their kind assistance in the preparation of this article.



UNIVERSITY TUTOR

The ongoing process of modernising and updating the Royal Air Force received another boost on 30 January this year, when the contract to replace the University Air Squadrons' (UAS) 26-year-old Scottish Aviation Bulldog trainers was formally agreed. The 10-year contract, part of the ongoing Private Finance Initiative (PFI), was signed in London by the representatives of the Secretary of State for Defence and Bombardier Services (UK), and will see the introduction to UAS flying of the Grob 115E — to be known within the RAF as the Tutor.

The current decade has already seen significant changes introduced to the RAF University Air Squadrons. First, a major reorganisation as part of the Defence Costs Study (DCS) led to a requirement for the units to provide around 65% of all pilot recruits and to conduct the first stage of their training programme — Elementary Flying Training (EFT). Secondly, following an announcement by the Minister in June 1998, all UAS sites are to be operated by a single contractor which will replace the current Bulldog aircraft with the 180hp Grob 115E under the ongoing PFI.

The UAS organisation was first conceived by Lord Trenchard in 1925 with Oxford and Cambridge being the first two Squadrons — the majority of the others being formed during WW2. However, flying stopped soon after hostilities ended with only ground training taking place. It was not until the 1950s that flying recommenced with the introduction of the DH Chipmunk

Kicking off a new regular RAF section to *Aircraft Illustrated*, **DEREK BOWER** introduces the Grob 115E Tutor — chosen to replace the Bulldog and train tomorrow's front-line flyers — and gives a background to University Air Squadron operations



Top: The RAF is procuring 100 Grob G115E Tutor two-seaters to replace the Bulldog in University Air Squadron service. The aircraft is shown here still with German civil registration, but sporting genuine RAF roundels. This +6/-3g airframe with Textron-Lycoming 4 Cylinder air-cooled engine has been well proven in operation, with the Royal Navy having flown five of the type since 1994. The aircraft to be supplied to the UAS have a 180HP AE10-360-BIF engine, uprated from the Royal Navy's 160HP version, and have re-designed avionics and radio fit to meet RAF specifications. Other operators of the G115 include the United Arab Emirates Air Force with 12 aircraft, and the 43 aircraft that operate in Australia training Chinese airline pilots. Bombardier Services (UK)

Above: Soon to be retired, the RAF's 115 Scottish Aviation Bulldog T1s have served for 25 years and provided initial flying experience for thousands of RAF and Royal Navy pilots. Seen here over North Yorkshire are XX620/C and XX620/B from the Yorkshire Universities Air Squadron flying in formation over the relatively flat Vale of York during a training sortie out of RAF Church Fenton. Derek Bower

UAS AND AEF AIRFIELD LOCATIONS (CURRENT)

UAS	AEF	Operating Airfield	Universities served
Glasgow & Strathclyde	(No 4)	Glasgow Airport	Glasgow University, Strathclyde University, University of Paisley, Glasgow School of Art, Glasgow Caledonian University
Liverpool	(No 10)	RAF Woodvale	Liverpool University, Lancaster University, Liverpool John Moores University, University of Central Lancashire
Manchester & Salford		RAF Woodvale	Manchester University, Salford University, University of Manchester Institute of Science & Technology, Manchester Metropolitan University
Birmingham	(No 8)	RAF Cosford	Birmingham University, Aston University, Keele University, Warwick University, Coventry University, Staffordshire University, University of Central England in Birmingham, University of Wolverhampton
London	(No 6)	RAF Benson	London University, Brunel University, City University, Hertfordshire University, Greenwich University, Kingston University, University of Kent, Canterbury College Kent To move to RAF Wyton
Oxford		RAF Benson	Oxford University, Reading University, Oxford Brookes University, Royal Military College of Science Shrivenham. To move to RAF Wyton
Wales	(No 1)	RAF St Athan	University of Wales, Aberystwyth, University of Wales, Bangor University of Wales, Cardiff University of Wales, Swansea University of Wales College of Medicine, University of Wales, Lampeter University of Glamorgan
Bristol	(No 3)	RAF Colerne	Bristol University, Bath University, Exeter University, University of Plymouth University of West of England at Bristol
Aberdeen, Dundee & St Andrews	(No 12)	RAF Leuchars	Aberdeen University, The Royal Gordon University, Dundee University, University of Abertay, Dundee St Andrews University
East Lowlands		RAF Leuchars	Edinburgh University, Stirling University, Heriot-Watt University, Napier University
Northumbrian	(No 11)	RAF Leeming	Durham University, Newcastle University, University of Northumbria at Newcastle, University of Sunderland, University of Teeside
Yorkshire	(No 9)	RAF Church Fenton	Bradford University, Hull University, Leeds University, Sheffield University, York University, Sheffield Hallam University, Leeds Metropolitan University, University of Huddersfield, University of Humberside
East Midlands	(No 7)	RAF Newton	Nottingham University, Leicester University, Loughborough University of Technology, Nottingham Trent University, De Mont University
Cambridge	(No 5)	Cambridge Airport	Cambridge University, University of Essex, University of East Anglia, Anglia Polytechnic University
Southampton	(No 2)	RAF Boscombe Down	Southampton University, University of Portsmouth

The UAS infrastructure was reorganised during the 1970s, when the core structure was rearranged to allow for pilot 'streaming' after Basic Flying Training (BFT), which was then conducted on the Jet Provost. ('Streaming' is the term used to grade student pilots into separate flying schools depending on their suitability to fly different types of aircraft ie Fast-Jet, Multi-Engine or Helicopters). This selection system continued up to the 1992 Government Defence Cost Study review paper, when it was decided to alter the training core syllabus in an effort to make financial savings. This revised system came into effect during 1995 and saw the introduction of early streaming for students on completion of EFT.

COST DRIVEN

As stated, the whole 1995 reorganisation was motivated by the DCS and finance-driven issues and at the time the UAS system was looked at very closely by the Treasury accountants for cost effectiveness. In its defence, the RAF cited the performance of 800 pilots trained between 1985 and 1992. The analysis showed that 45% of UAS students reached a fast-jet cockpit; the corresponding figures for Graduates (non-UAS) and Direct Entrants was 30% and 25% respectively. The conclusion from this was that if you wanted to fill the required annual number of fast-jet cockpits without UAS input, then initially more students would be required to start the course, therefore

Flight Five Grob 115D trainers have been flown since 1994 by the Royal Navy for flying grading of prospective Royal Navy pilots. Seen here are all five posed for the cameras over the south coast. Grob Aerospace



requiring an increased training financial budget. The outcome of the study was upheld and the UAS retained. Highlighting the effectiveness of the recent changes, since the introduction of early streaming the number of students not progressing to Basic Jet Training has dropped quite remarkably.

Several other changes were implemented during this DCS, including the Air Cadet organisation Air Experience Flights (AEF) being merged into the UAS organisation, therefore allowing the withdrawal of the DH Chipmunk. One other significant change was the creation of a Tri-Service EFT — a single EFT School for the use of the Royal Air Force, Royal Navy, Army and Foreign and Commonwealth Students. This enabled the Army EFTS Chipmunks at Middle Wallop to be withdrawn leaving the Battle of Britain

Memorial Flight (BBMF) as the only service user of the Chipmunk!

After all the highlighted changes, today's UAS/EFTS mission is stated by Officer Commanding EFTS at RAF Cranwell, Grp Capt Phil Owen as follows, 'To sustain the front-line by training the required number of students to EFT output standard'. To maintain this mission, it has four main aims within the UAS structure:

- To attract entrants of good calibre and learning into the RAF.
- To supervise holders of RAF University Cadetships and Bursaries.
- To provide Elementary Flying Training for flying members and officer ground training for all members.
- To maintain a close liaison with the University authorities.

EFFECTIVE EFT

Another move to consolidate cost effective training was made during 1994 when the RAF and Royal Navy merged their Elementary Flying Training programmes to form the Joint Elementary Flying Training School (JEFTS). The school has now evolved from the initial Squadron and during 1995 moved to RAF Barkston Heath, operating a mixed fleet of the Slingsby Firefly 260 for EFT, and the Firefly 160 for Multi Engine Lead in Training (MELIN) and grading of Pilots. The unit expanded even further when the Army EFT was subsumed during November 1996, to be followed by Army flying grading from April 1997.

Currently Firefly 160 operations are centred on the grass airfield at RAF Newton and the grass landing strip at RAF Cranwell, with the heavier Firefly 260 operating from RAF Barkston Heath. This airfield undertakes all RN and Army EFT and the 35% balance of EFT not flown on the UAS units. The recent heavy workload has resulted in a lack of runway availability from the currently operating JEFTS airfields, and to overcome this problem Ministerial approval has been gained to transfer 30% of the EFT task to RAF Church Fenton. Operations began during January 1999 at this ex-No 7 FTS Yorkshire airfield, and it is now responsible for providing the Instructors, maintenance, and support services for up to 10 aircraft daily for the JEFTS programme.

An overall EFT budget of £12.5 million for Fiscal Year 1998/99 will provide a total of 650 pilots with 23,500 flying hours over a rolling three-year training period, aiming to provide the RAF with just over 100 pilots each year. During this same 1998/99 period, the Air Experience Flights (AEF) will expend £4 million of this budget providing 45,000 Air Cadets with 18,500 hours flying time.

TRAINING PROGRAMME

The UAS has always been scattered around the Country to maximise the amount of University locations. Currently there are 12 flying locations (see separate listing), all taking students from more than one University. For example, the Yorkshire UAS feeds from a total of nine.

Although the UAS are geographically scattered and all work relatively independently, they all follow the same training programme, as detailed below:

UAS PILOT FLYING TRAINING

	Dual Hours	Solo Hours	Total Hours
First year			
a Basic Flying			
b Spin Aeros Check	23	4	27
Second year			
a Applied Flying (General Handling, Navigation, Instrument Flying)			
b Intermediate Handling Test			
c Preliminary Instrument Flying Grading			
d Pilot Navigation Test	32	8	40
Third year			
a Advanced Flying			
b Final Handling Test	11	5	16
Flexibility	7		7
Total	73	17	90

UAS NAVIGATOR SYLLABUS

	Hours
First year	
Pilot Training to First Solo	15
Second year	
Basic Navigation	25
Third year	
Advanced Navigation	
Final Navigation Test	20
Total	60

Introduced for the first time during the autumn of 1998 was a Ground Branch of the UAS. This move was designed to boost the required number of young Officer recruits into the ground trades entering direct from Universities. This is one of a number of initiatives designed to reverse the post DCS 'drawdown' in the overall manning levels of the RAF, now that recruiting targets have risen again.

Another move designed to increase overall student input, is the introduction of attendance pay. For many years Bursaries and Cadetships have been available to students, and this particular initiative is designed to financially assist students especially during University holiday periods, when otherwise they may be enticed away to take paying part time jobs. However, the payment is capped at a low figure to ensure that it supports flying training, and is not merely an attendance incentive.

BULLDOG SPIRIT

Amid all of the changes to the UAS system, the most visible will be the type of training aircraft it uses. Currently around 115 Scottish Aviation Bulldog T1 aircraft are flown, and have been since early 1973. Initially a total of 132 were ordered under Contract number KA1C/147/CBA 1C, but this was later amended to 130. Deliveries began with XX513 (which made its first flight on 30 January 1973), with subsequent aircraft going to the UAS, Central Flying School (CFS), Royal Navy EFTS (operating from RAF Topcliffe), and No 2 Flying Training School (No 2 FTS) based at RAF Leeming. Over its service years, the Bulldog has

accumulated many thousands of flying hours, assisting to further the flying career of thousands of RAF and RN Pilots. To this list can be added the pilots of many other foreign and Commonwealth air forces who have passed through the RAF and RN non-UAS training systems.

TUTORIAL

After a long and detailed contest, Bournemouth-based Bombardier Services was selected to run the 12 Bulldog operating sites from April 1999. The spirited Bulldog is being replaced by the Grob 115E Tutor, starting in July this year, when the first aircraft will be handed over to RAF Cranwell for acceptance trials. The carbonfibre reinforced plastic (CRP) two crew (side by side seating) aircraft, to be built at Mattisies in Germany, will be used to deliver up to 50,000 hours of UAS and AEF flying per year. A delivery rate of around four to five aircraft per month has been slated, with a fully operational date for all 100 Tutors put at August 2001. The first unit to receive the new aircraft will be Cambridge UAS, which is set to take its earliest example at its new home of RAF Wyton, Hunts, in September. The aircraft will be operated in an all-white colour scheme with a blue trim, as opposed to the RAF's adopted yellow and black high visibility colours, because of the risk of heat damage to the Tutor's composite wing construction.

Prolonged negotiations for the contract began during May 1996 with a bidders conference, which led to invitations to bid being issued to three companies — FRA SERco, BRAMA and Shorts (now Bombardier). On 18 June 1998 Bombardier was announced as the preferred bidder, which led to further extended detailed negotiations. 100 aircraft will be purchased by the company, and will remain company owned. This means that they will be kept on the civil register, although they will sport RAF roundels and squadron markings to signify the operator. Within the original tender was the requirement for the contractor to not only supply the aircraft, but also provide such things as air traffic control, fire/crash rescue, transport, and catering depending on the site in question. The Grob 115E airframe — very similar to the already operational 115D — will be no stranger in the south west of England, as the Royal Navy has been operating five 115D airframes from Plymouth Airport since 1994 for its own flying grading programme.

Currently the Bulldog instructor pilots are 80% military and 20% civil, and this ratio will continue when the Grob 115E is introduced. It is important to highlight that all the 'civilian' instructors are employed as MoD Aviation Officers (AvO), and hold a Civil Service grade and all are ex-military A-Category instructors.

Therefore, the new Tutor and its instructors look set to provide a valuable link in the training of the UK's future military pilots.

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Three point turn



On 31 March 1999, the days of the Tri-National Tornado Training Establishment (TTTE) came to a close, ending a period of nearly 20 years of Tornado operations from RAF Cottesmore. **DEREK BOWER** describes this highly successful and important contribution to the air forces of the three nations involved and the new challenges ahead for the station

By the time these words are read, the familiar sight of German, British and Italian Tornados standing in rows along the ramps at RAF Cottesmore will have been consigned to a very unique chapter of aviation history books. After 18 years of flying the type in an operational conversion role, the Tri-National Tornado Training Establishment (TTTE) disbanded on 31 March, leaving its Leicestershire station to prepare for major change in its operational role.

Since the arrival of its first aircraft, Vickers Wessleys of Nos 35 and 207 Squadrons on 20 April 1938, many differing types have been based at RAF Cottesmore. Of these, the Panavia Tornado has been the longest serving. At the time of its arrival, a great deal of construction work had been in progress to accommodate the all-new machines. This work was quite substantial and involved such things as new living quarters and conversion of one of the existing C-

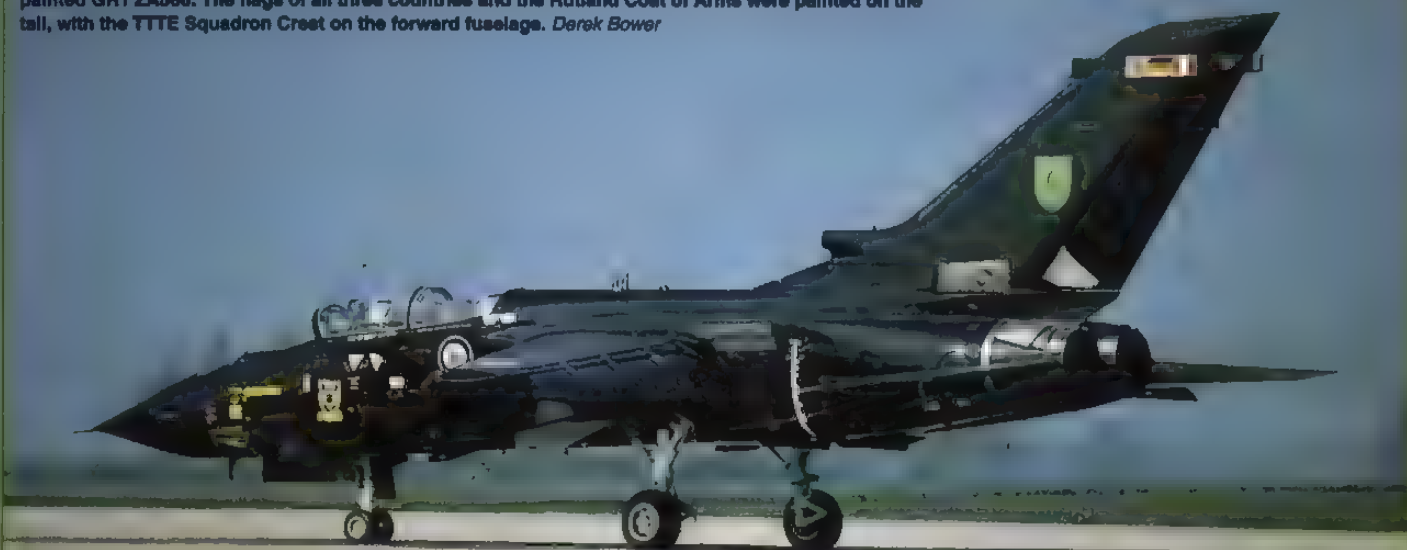


hangers to an extensive RB199 engine servicing centre. One major reconstruction task proved to be quite a daunting point, this being the hardstanding for the day-to-day aircraft parking and servicing. Operating the aircraft from the existing dispersed areas around the airfield was evaluated, though this was declared unsuitable in favour of a quickly laid 10 acre concrete aircraft servicing platform (ASP).

The first two Royal Air Force GR1s, ZA320 and ZA322 arrived on 1 July 1980, in the hands of BAe test pilots Paul Millet/Olly Heath and David Eagles/Ray Woollett. They emerged from a grey overcast sky to be

Left: Stunning posed view of 28 TTTE aircraft, and around 500 RAF Cottesmore personnel. Quite evident in this photo is that after 18 years of operating the Tornado, the three partner nations are now diversifying somewhat in the choice of camouflage schemes for their aircraft. RAF Cottesmore.

For the 1995 air show season, the TTTE was chosen to represent the Tornado GR1 squadrons at displays. Seen ready to depart RAF Cottesmore are Flt Lts Mike Alton and Mike Harland in specially painted GR1 ZA560. The flags of all three countries and the Rutland Coat of Arms were painted on the tail, with the TTTE Squadron Crest on the forward fuselage. **Derek Bower**



Although all TTTE aircraft were operated in a pooled fleet from RAF Cottesmore, each nation's aircraft retained their own identity. This three-ship formation represents one aircraft from each country, and, as are all TTTE aircraft, they are quite unique from operational squadron machines due to a complete lack of any weapons/store pylons. **RAF Cottesmore**

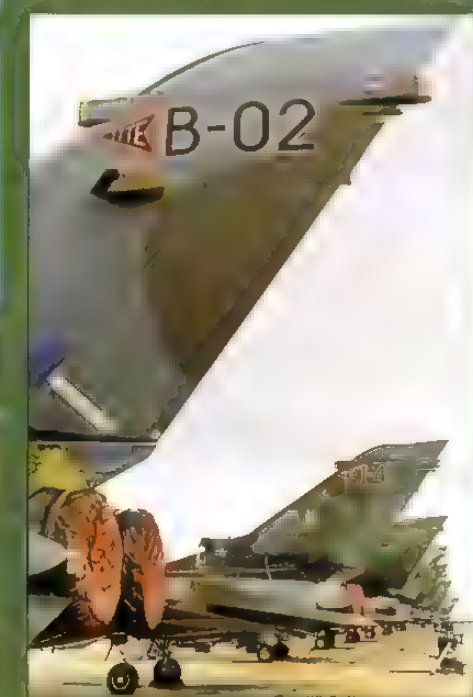


Left: Italian Air Force Tornado MM55001/440 on final approach to RAF Cottesmore. The use by the Italian Air Force of five digits as opposed to four in the MM serial number usually indicates a twin stick training aircraft. The stylised 'B' on the tail denotes this aircraft is from Bravo Squadron, one of the four independent squadrons within TTTE. One of these, the Standards Squadron, taught students to become Tornado instructors while the other three squadrons (A Squadron, B Squadron, and C Squadron) were solely for training students. **Derek Bower**

Below: This familiar sight on the Cottesmore ramps is now a thing of the past with the three nation's jets having been re-deployed to their respective training units. Heading the line is a British example (training on which will be amalgamated into No 15(R) Squadron), next to this is an Italian aircraft (now based at Ghedi) while the Germans will carry out their Tornado training at Holloman AFB, NM. **Richard Coombe**



Above: For ease of maintenance, aircraft were occasionally rotated around different nation's squadrons through the years. Seen here during April 1995 in quite a rare combination of markings is ex-MFG Tornado 43+79 still in the discontinued *Merlenfleiger* paint scheme. It had been allocated to A Squadron and carries the G76 code and TTTE markings. Each air force marked their aircraft with a code to identify its own. **Derek Bower**



welcomed by the then-AOC 1 Group, Air-Vice Marshal M. W. P. Knight, and the then-Station Commander, Wg Cdr B. N. Wanstall and his growing team of senior executive officers. Aircraft from the German Air Force began arriving from 2 September that year, with the first Italian Tornado appearing on 5 May 1982.

The arrival of these aircraft was the result of an initial Joint Operational Training Study undertaken by the three partner countries — Germany, Italy and the UK. This study group reported during March 1975 and recommended the use of RAF Cottesmore as the base for the Tornado training unit, known as the Tornado Operational Conversion Unit (TOCU). This was duly ratified on 8 May 1979 when the Tri-National Memorandum of Understanding was signed to form what was to become better known across the three partner Air Forces as the TTTE — commonly pronounced as the 'Triple-T-E'.

The unit was officially declared operational on 29 January 1981 by three Chiefs of Air Staff, ACM Sir Michael Beetham, RAF, Generalleutnant Friedrich Obleser, *Luftwaffe*, and Generale di Squadra Lamberto Bartolucci, *AMI*, while representing the *Marineflieger* was Adm Gunter Fromm, C-in-C, Fleet. This ceremony was quite an impressive event with many of the weapons intended for the Tornado laid out on show to the vast numbers of high ranking Officers, dignitaries and press in attendance.

Unfortunately, similar to the arrival of the first two aircraft, the weather was to play a significant part in trying to upstage the grand occasion. Part of the day's ceremony was to be a fly past of aircraft from all partner nations, but due to the cloudbase being almost on the ground at the time, this was cancelled. However, one lone Tornado crewed by Wg Cdr O'Brien and Sqn Ldr Morris managed a flyby for the assembled guests — not that they could see it, but they certainly heard it!

As new-build aircraft became available, numbers gradually rose to the established total of 48, this figure being reached during August 1982. Of these, 22 were from Germany (including the *Marineflieger*), 19 Royal Air Force, and seven Italian Air Force. The difference in airframe numbers relates to each individual nation's training programme requirements, which is also evident in each nation's differing financial input to the project. In financial percentage terms, this amounted to Germany providing 42.5% of the total budget, with the UK providing 40% and Italy 17.5%.

As availability of airframes increased, so did the training hours flown, with the first of many milestones over the years being achieved during July 1986 when over 1,000 training sorties were completed.

From the outset, the idea of the three-nation venture was to promote Tri-National interests with an agreed training syllabus in operation. As expected, this often led to the unique situation where a German student pilot would be taught by an English instructor



The flag comes down on the TTTE. After 20 years training aircrew and instructors of three nations on the Tornado, the TTTE was finally disbanded in early 1999.
M G Britton

in an Italian aircraft, or any possible combination of these three variables.

The first all-TTTE crew to fly on a training sortie took to the air on 27 August 1980, comprising RAF Sqn Ldrs Tebb and Ball. Since then, no less than 273 courses have been completed, successfully qualifying 3,350 crew, with 338 aircrew taking refresher courses and a further 727 crew trained to be Tornado instructors.

History always shows that 'all good things must come to an end' and this notion was echoed with the closure of the TTTE. From 31 March 1999, the base will have seen the last of the Panavia Tornado as a result of the three partner countries having chosen to go different ways with the training of their aircrew. This major change in policy was brought about by the increasing diversification in the role of the Tornado since its introduction, with the many updates having taken place to the airframe during operational service, and the commonality between the nation's aircraft roles having slowly diverged. This will be further highlighted now that the RAF GR4 is entering service — an upgrade option not undertaken by the German or Italian Air Forces.

Further to the differing airframe and avionics situation, the three countries have decided to undertake crew training in differing ways to capitalise on each nation's differing roles. The *Luftwaffe* has decided to take all Tornado training to the United States at Holloman Air Force Base, NM, and the *Aeronautica Militare Italiana* is to revert to training crews back in Italy.

Commencing 1 April 1999, the RAF is to form a new training unit at RAF

Lossiemouth. Initially, the new unit was to be known as the National Tornado Operational Conversion Unit (NTOCU) but after a change of decision this is now to form part of the existing No 15(R) Squadron. This combined squadron will be tasked with training students to fly the GR1/1A as did the TTTE, but will also now encompass the existing role of No 15(R) Squadron to instruct newly qualified Tornado pilots in the weapons delivery role, undertaken in the past by the Tornado Weapons Conversion Unit (TWCU) at RAF Honington.

Although all Tornado GR1/1A training is now taking place from one airfield, no plans are yet being formalised to begin GR4/4A training from RAF Lossiemouth. This will continue to be conducted at individual squadron level as each newly converted aircraft arrives on the squadrons.

However, it is eventually expected that the airfield will convert to instruct Tornado GR4/4A crews as the use of the GR1/1A begins to diminish. Concurrently, plans for a GR4 Simulator for RAF Lossiemouth are now being discussed.

The end for TTTE began with the official disbandment ceremony taking place at RAF Cottesmore on 24 February 1999. Again, by an amazing piece of fate, this occurred on a cold, cloudy, misty day, similar to the weather during the original opening ceremony. On this occasion however, the planned flypast was able to take place — though only just! The reviewing Officers from each partner nation were the Chiefs of Air Staff from all three air arms, and the German Navy Commander in Chief Fleet. For the Royal Air Force, ACM Sir Richard Johns was present with Generalleutnant Rolf Portz for the *Luftwaffe*, Gen Andrea Fornasiero for the Italian Air Force and Vice Admiral Dirk Horten representing the German Navy.

Each made their individual views well known regarding the professionalism of the TTTE in providing a vital support role to NATO over its many years, but all made a special point of thanking the local community of Cottesmore, and the surrounding areas, for the immense support shown to the station over the 18 years of TTTE. To quote Sir Richard Johns, the unit's total of 163,000 flying hours 'is a monumental yardstick by anyone's standards'.

Although such a large flying squadron is to leave, the future for RAF Cottesmore looks far from bleak. Vast amounts of construction work is currently underway to prepare for the arrival of its next occupants, the Harrier GR7s of Nos 3 and 4 Squadrons. Both squadrons will relocate from RAF Laarbruch, Germany, in a move expected to be complete by mid-May 1999. This action, and the recently announced Joint Force 2000 proposal, will see the amalgamation of the entire RAF Harrier GR7 fleet with the Royal Navy's 28-strong fleet of Sea Harrier FA2s at the combined Harrier bases of RAF Cottesmore, and nearby RAF Wittering.

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PPP plans for NATS

In 1998 the government announced that it was planning to change National Air Traffic Services Limited into a Public/Private Partnership, separate from the Civil Aviation Authority.

This would be achieved by allowing 51% of its shares to be held by private investors, with 49%, plus a 'golden share', being held by the Government.

The new arrangements will permit NATS to be freed from Government spending constraints, separation of the regulation of air traffic services from service provision and greater freedom in a highly competitive environment.

The continuing growth in air traffic, year upon year, is creating delays for traffic which reached crisis point in the 1980s. Huge investment in the infrastructure of ATC is essential to enable the system to cope in the years ahead.

In a lecture to the Chartered Institute of Transport, Mr Bill Sample, chief executive of NATS, supported the proposals. 'Some people say that by concentrating on the commercial aspects of providing an ATC service, safety standards may be eroded. Safety is our business. We must and we will ensure that the process of commercialisation is not allowed to undermine safety.'

In fact, there is no reason why commercialisation should not enhance safety by making the system more efficient, productive and responsive.

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'The key is 'independence' but subject to safety and economic regulation.'

The plan has also received the support of Sir Malcolm Field, chairman of the Civil Aviation Authority. The Guild of Air Traffic Control Officers has responded to the proposals in the consultation document. As might be expected, the Guild is seeking assurance on the impact of PPP on air traffic safety and full consultation with all parties.

Take your positions

Air navigation services via satellite can be provided by two principal systems available today (one American and one Russian), both of which were originally developed for military use.

The American system (GPS or Global Positioning System) consists of 24 satellites with a free service (the standard positioning service) which gives an accuracy level of 100 metres in the horizontal plane for 95% of the time. A more accurate service is possible but this is only available to the military.

The Russian version (the Global Navigation Satellite System — GLONASS) has the capability of providing an accuracy level of 24 metres horizontally.

Both systems do have drawbacks which mean that errors can occur and users need to have a higher degree of confidence in the position information. Neither system can be used for the landing phase of a flight.

It is proposed to deal with this in European airspace by the use of an additional system which cross-checks the satellite broadcasts and checks the information for accuracy. The method for achieving this lies in the validation of the European Geostationary Navigation Overlay System or EGNOS, hopefully by the year 2002.

EGNOS will use two Inmarsat satellites positioned in geostationary orbits, one over the Atlantic and one over the Indian Ocean. These will use transponders to receive signals and calculate the degree of error in the GPS or GLONASS systems which can then be relayed to aircraft to give a very accurate position.

The system is currently being put through its paces by the North European Satellite Test Bed (NESTBED), organised through National Air Traffic Services in conjunction with RACAL, BT and INMARSAT.

SID update

Four trial standard instrument departure (SID) routes at Luton Airport, which use the Flight Management System on board the aircraft to maintain the correct track, will continue in use until 20 April 2000 unless otherwise notified.

The four routes are entitled Compton 2 Zulu, Clacton 3 Zulu, Dover 3 Zulu and Detling 3 Zulu.

For those aircraft not fitted with the appropriate equipment, the conventional departure routes will remain in use. These are Compton 2 Bravo, Clacton 6 Bravo, Dover 7 Bravo and Detling 4 Bravo.

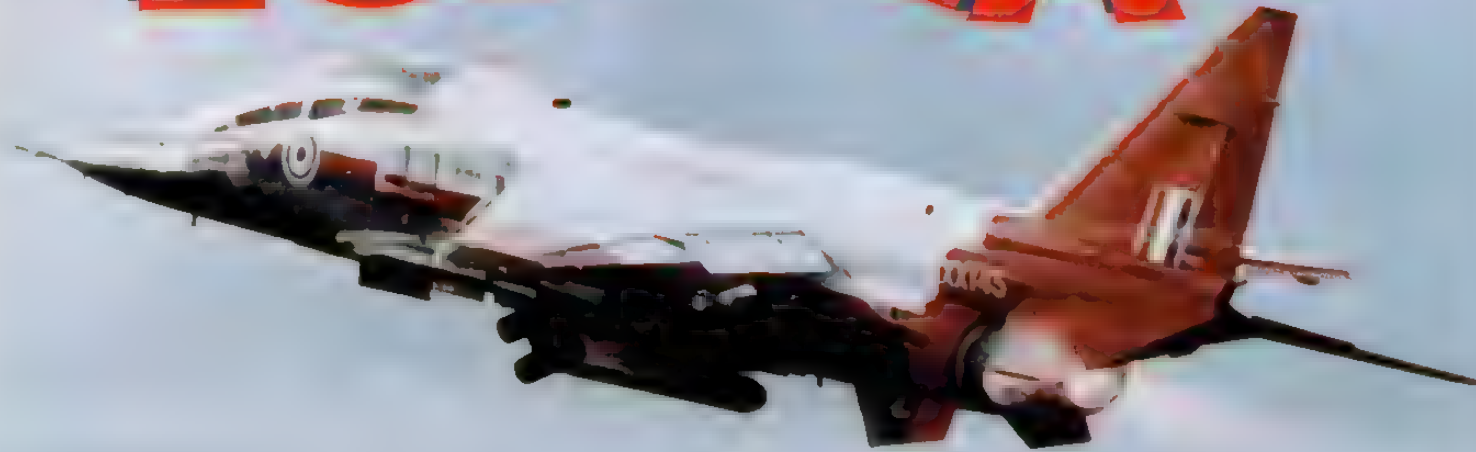
The use of the Trial SID Procedures will be available only to aircraft of UK operators whose Flight Management Systems and associated Operating Procedures have been approved, in writing, by the Civil Aviation Authority. In order that the Flight Management System may be approved by the Authority as the sole navigation aid for the Trial departure procedure, the following will be the minimum equipment fit for the aircraft:

- Dual FMS, comprising dual FMC and dual CDU; with
- Dual Inertial Reference Systems, employing a Ring Laser Gyro, giving position information to the FMS, and
- Auto-pilot steering commands from the FMS enabling auto-pilot coupling; and
- Dual navigation displays which can show in pictorial form the complete SID prior to take off; and
- Automatic updating of the FMS position at the beginning of the runway prior to take-off

(The waypoints defining the SID in the FMS database cannot be changed or modified by the crew).

Speed limits for individual turns are not specified other than the standard ATC 250kts maximum specified for all SIDs. Operators should determine the optimum speeds for their particular aircraft type and FMS equipment to achieve the required ground tracks.

TOP CATS



FARNBOROUGH'S FELINES. In our on-going series of articles on the Jaguar, JON LAKE provides a technical low-down on the finely-tuned 'Cats' used for testing and trials at Farnborough. All photographs by DERA

Britain's test, research and development establishments have traditionally used a wide variety of disparate aircraft types to support their work. Relatively small numbers of the latest front-line aircraft types have been augmented by 'workhorse' types, usually older, often in the twilight of their service careers, and sometimes actually withdrawn from active service entirely. Thus places like Boscombe Down and Farnborough were the last haunts of aircraft like the Buccaneer, Hunter, Meteor and Sea Vixen in military use.

The RAE at Farnborough (later DRA Farnborough, then DERA) and the Aeroplane and Armament Experimental Establishment (later DTEO) at Boscombe Down began using Jaguars even before the type entered front-line service, usually borrowing aircraft from the manufacturer or the RAF on an as-required basis. In recent years, however, the availability of surplus Jaguars (following the type's replacement in RAF Germany) has allowed fairly large numbers to be taken on charge as long-term test and trials aircraft. To a certain extent, the Jaguar could be described as DERA's 'Hunter for the 1990s'.

The Jaguar is obviously a very useful tool for DERA and DTEO, since it represents an actual in-use front-line aircraft type, but, perhaps more importantly, offers performance and handling characteristics which are still broadly representative of modern fast jets, with a genuine high-speed low-level capability. When the RAE and A&AEE relied



Top. Hot cat — Jaguar XX145 seen powering away from Farnborough in typically flamboyant fashion. This aircraft was briefly assigned to Farnborough to test the aerodynamic clearance of the centreline carriage of TIALD.

Above: Who said you can't teach an old cat new tricks! Jaguar T2B XX835 showing off its Jobtac (Jaguar Off-Boresight Target Acquisition) system, plus AIM9L and Helmet Mounted Sight.

on aircraft like the Hunter and Canberra, these subsonic, relatively simple types were a far cry from front-line types like the Lightning, and Phantom. Use of the Jaguar today gives DERA and DTEO a much more representative platform. Moreover, the type is one that enjoys excellent support infrastructure,

since it remains in front-line use.

JAGUAR T2, XW566

The first Jaguar acquired by the RAE for full-time test duties was XW566 (B-08), the first prototype British two-seater, and the third British Jaguar to fly. The aircraft had



Hiding behind its camouflage, XW566 was in fact the prototype two-seat Jaguar T2 and never saw operational service, as seen here

actually made its maiden flight on 30 August 1971, and had subsequently spent most of its career flying development and demonstration sorties for the manufacturer (BAe and later BAe).

The aircraft was used for trials with a pod-mounted Agave radar (as used in Indian Maritime Jaguar Internationals) the radar and associated radome being mounted in the leading edge of a converted centreline fuel tank. It was also used for early Helmet Mounted Display (HMD) evaluations, and for rough field take-off and landing trials at Boscombe Down.

The aircraft's trials had also included evaluation of the 55mm Intensified Image Isocron LLTV camera with Intensifier IMC stabilisation in support of the RAE's AST396 and AST610 requirements. This night vision work followed the competitive evaluation of a daylight TV system, and of 25mm Intensified Ebsicon and the 50mm Intensified Image Isocron LLTV cameras in an A&AEE Phantom. Between March and June 1977, XW566 flew 20 sorties with the podded Isocron LLTV camera, with the picture presented to the pilot on the HUD. However, the imagery obtained was of poor quality and the HUD display was of insufficient detail and clarity. This was severe enough for flying and systems management to be impossible with any degree of confidence. A better, wide angle field-of-view (FoV) HUD was clearly needed. While the trials also pointed to the need for anti-reflective coatings and shrouds for the LLTV, and auto-gain to allow the LLTV to automatically compensate for bright light sources.

With the aid of the RAE's Flight Systems Department, XW566 and the RAE's night-black trials Hunter were used for trials of an enhanced 5in HUD (actually a Smiths Industries 4.5in dual combiner HUD) and LLTV, these proving that low-level terrain-avoiding flight could be undertaken by night using LLTV. A small TV monitor was fitted in the rear cockpit, for use by the safety pilot.

By 3 February 1982, when XW566 arrived at Farnborough, the aircraft looked very much like any other Jaguar T2, with the production standard tall tailfin and intakes that lacked clutter plates. It arrived still carrying an underfuselage LLTV pod. But under the skin, it was a very different story, with the aircraft lacking some 800 individual modifications by

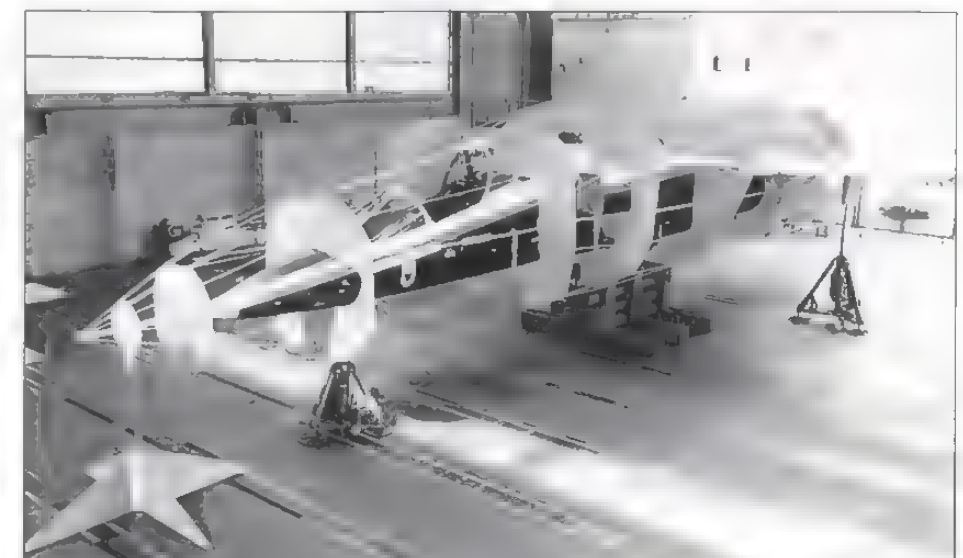
comparison with the then-standard modification state. Wiring for each experiment or trial undertaken by BAe had been added as required, and had seldom been removed. This resulted in a huge, non-standard wiring loom that included many redundant cables. Neither Farnborough's Aircraft Department nor its Flight Systems Department were able to identify all of the wiring. This was a serious drawback, since some of the affected systems were flight safety critical. The autostabiliser electronics were completely non-standard for example. The cost of upgrading the aircraft to standard configuration was estimated as being in the order of £1.5 million.

But only 50 of the 800 missing 'mods' were judged to be necessary to bring the aircraft to an acceptable airworthy standard for test and trials use, while other modifications could (if necessary) be incorporated on an opportunity basis. The aircraft was sent to No 5 MU at Kemble (the RAE's paint and finishing specialists) for re-painting in the RAE's new red, white and blue raspberry ripple colour scheme. XW566 was re-delivered to Farnborough in June 1982. Unfortu-

nately, the aircraft's return from Kemble was followed by discovery of a cracked starboard ventral fin, a loose starboard strake and leaks from both fuel collector tanks. Rectification took until July 1983. The air conditioning system was completely non-standard, and RAE technical personnel soon assessed that on average it was likely to fail 'every other flight'. Further rectification (including replacement canopy seals, a loose article search, hydraulic leak repairs and a rebuild of the rear fuel system) delayed the first flight until 13 December 1983.

Despite continued poor serviceability, trials of the Smiths-supplied Hughes diffractive optics HUD and LLTV progressed with remarkable speed. Unserviceabilities were legion, large and small, and encompassed a veritable A-Z of problems (air conditioning system, AoA gauge, autostab, anti-g system, cabin pressurisation, canopy jettison, compass, differential tailplane, engines, fire extinguishers, flaps, NAVWASS, pitot-static system, PMD, and Radalt), capped by a birdstrike.

This record of unserviceability, combined with the aircraft's early 'mod' state, increasingly unsupportable Adour Mk102 engines and its need for a major servicing prompted the retirement of XW566 from flying duties, and from 1985 the aircraft was used for ground-based EMC trials. Some had expected that the aircraft might be used for training but this was impossible because of the very non-standard cockpit configurations.



Above right and right. Ninth life — old age and non-standard equipment meant that XW566's career at Farnborough was always going to be problematical. The aircraft eventually wound up as a test rig for ground-based EMC trials.

May 1999

In contrast to the ageing XW566, Farnborough's replacement Jaguar T2, ZB615, was the last of the type to be delivered to the RAF.

JAGUAR T2, ZB615

Farnborough received a replacement twin-stick Jaguar in 1983 in the shape of ZB615, the last Jaguar delivered to the RAF. Originally built for Oman, the aircraft had an International standard wing, though its over-wing hardpoints were not activated. Delivered in raspberry ripple colours, ZB615's paint scheme differed slightly from that applied to XW566, though it was eventually re-painted in the same style, with a cheatline following the line of the nose. Fitted with NAVWASS from the start, the aircraft soon received a cockpit modified to be compatible with Night Vision Goggles (NVGs), subsequently serving as the model for the current Trial Installation NVG compatible cockpit. The aircraft was also used for cockpit noise reduction trials, paint trials and even dropped some bombs and fired its guns at Decimomannu, though it is unclear as to whether this was for a specific trial, or for pilot currency. The aircraft was primarily used for continuation and conversion training, and was converted to T2A standards with FIN1064 INAS in the late 1980s. Contrary to some published reports, the aircraft was never assigned to the Institute of Aviation Medicine. One of the last aircraft to leave Farnborough, ZB615 became a common user aircraft at Boscombe Down, shared by the ETPS and the FJTS.



Sidewinder acquisition rounds, with some help from BAe, which had cleared Omani two-seaters to carry AIM-9s. The aircraft made two trips to Decimomannu for use on ACMI instrumented air combat range, and flew with Farnborough's indigenous oxygen-mask mounted system (similar to the sight known to have been deployed by the SAAF), and with the forerunner of what became GEC's current Jaguar 97 HMS system. The HMS (Helmet Mounted Sight) equipment was evaluated in air-to-air and air-to-ground applications (the latter including target cueing from the FIN1064) and with NVGs. The programme is generally credited with having laid the groundwork for the current Jaguar 97 helmet sight programme.



lighting, and a new MODAS Data Acquisition System, the latter displacing the starboard cannon. The aircraft received a Major overhaul, and was fitted with a COMED MFD (Multi-Function Display) in the rear cockpit, similar to that fitted to later Indian Jaguars. This allowed imagery to be overlaid over the moving map display. The aircraft also flew with an RAF-built LLTV system, produced by marrying up a commercially available minicam with NVG tubes.

From 1989, XX835 was used primarily in support of Helmet-Mounted Sight systems. The aircraft was cleared to carry AIM-9

Right: The front-office of XX835, fitted with GEC Diffractive Optics Z-HUD and an NVG-compatible lighting fit.

Below: Jaguar T2 XX835 fitted with centreline LLTV pod. The aircraft retained its operational camouflage throughout its testing career.



JAGUAR T2, XX145

Another red, white and blue Jaguar T2 was briefly operated from Farnborough. XX145 was an instrumented ETPS aircraft borrowed for aerodynamic clearance of the centreline carriage of TIALD, prior to the *Nightcat* single-seat TIALD trials using XX833, described below. The aircraft's stay at Farnborough was very short.

JAGUAR T2, XX835

The last two long-term Farnborough Jaguar T2s retained operational camouflage. The first of these aircraft was XX835, a long-term part of the No 226 OCU fleet at Lossiemouth before passing to the A&AEE at Boscombe Down and then, on 6 August 1984, to the RAE. The aircraft was used for a classified trial until November 1984 (eight flying hours) when it was grounded for a Minor servicing, completed in March 1985. The aircraft was then converted to T2A standards, with the FIN1064 INAS. This took until the end of August, when the aircraft was fitted with a new GEC Diffractive Optics Z-HUD and an NVG-compatible lighting fit. A throttle fault prevented the aircraft from flying until May 1986, when it began LLTV/HUD trials, using the centreline LLTV pod originally carried by XW566.

This equipment was, by 1986, fairly old, and the imagery produced was not good enough to exploit the capabilities of the new HUD. Meanwhile, FLIR (being tested on the so-called *Nightbird* Buccaneer) showed more promise, and the RAE's emphasis turned to various types of FLIR, some of which were tested on another RAE Jaguar, XX833.

In 1987 and 1988, XX835 underwent a series of new equipment installations, adding improved NVG-compatible cockpit



Back to the wild — after 10 years of test flying at Farnborough, Jaguar XX835 was returned to squadron service as a TIALD-compatible T2B.

The RAE's work on HMS was of course based on the use of sophisticated head-tracking equipment, and this soon found an application on another Jaguar — this time a car! Concerned to provide drivers with the best possible visibility, Jaguar cars decided to conduct a research programme to 'map' exactly where drivers are able to look. Rather than simply using dummies and drawings of a car, Jaguar decided to use various real human subjects, actually driving the car (altering the seat height, rake and position). An electronic head position sensor (mounted on a headband) was fitted, and head position was tracked and 'mapped' throughout a 40min test drive. DRA scientists and engineers provided invaluable advice, and the DRA loaned the company some equipment. The trials were a great success, and rave reviews of Jaguar's new XK8 (and especially the level of visibility) bear testament to the DRA's work!

In February 1994, the RAF (by then somewhat short of twin-stick Jaguars) surveyed XX835, which then had logged only 2,274

flying hours. Some 97 trial modifications were removed from the aircraft, returning it to the standard T2A standard. The aircraft returned to the front-line, subsequently becoming the first of two TIALD-compatible T2Bs. The DRA's engineers and scientists were justifiably proud of their achievement in maintaining the aircraft to such a high standard that it could be returned to service, though there were some mixed feelings. XX835 had been the most successful R&D Jaguar, spending a productive 10 years at Farnborough during which it was used in support of trials which explored wide FoV HUDs, NVGs and HMS development.

JAGUAR T2, XX833

Following the success of FLIR on the *Nightbird* Buccaneer, the first *Nightrider* Harrier and Bedford's Tornado, the RAF decided that a Jaguar trials aircraft should be similarly modified with FLIR and an NVG-compatible cockpit. The aircraft chosen was the T2A fleet leader, XX833, which was duly despatched from No 41(F) Squadron at

Coltishall to the RAE on 8 April 1988. At the RAF's behest, the aircraft was fitted with two new GEC-Marconi raster-capable HUDs (to display FLIR imagery), and a MIL STD1553B bus controller and was fitted with a podded GEC 1010 FLIR below the port inner wing station. This was officially known as the Atlantic pod. The EO image in the HUD was harmonised with the 'real world' HUD picture, to give a 1:1 correlation of FLIR picture and the pilot's actual view of the outside world through the HUD. This effectively gave the pilot an enhanced forward view at night, while NVGs could be used to 'look into the turn' and to provide enhanced vision outside the area covered by the HUD.

The *Nightcat* trials soon identified what would be needed in an operational installation. The aircraft initially retained its No 41(F) Squadron insignia, and was pictured in *Flight International* and a Jane's yearbook carrying Atlantic in these front-line squadron markings, leading some to assume that the equipment had been 'sneaked' into front-line service. In fact the aircraft moved back and forth between the DRA and the SAOEU at Boscombe Down, and soon gained the more appropriate insignia of the Boscombe-based SAOEU. The aircraft's experimental night attack role soon led to it becoming known as the *Nightcat* Jaguar, following the *Nightbird* Buccaneer and *Nightrider* Harriers.

The *Nightcat* team soon became peripherally involved in the development of a second Jaguar equipped with night vision systems. This was *Prometheus*, a Straight Six, 4.0 litre Jaguar Sovereign motor car! 'Prometheus' (H915 LWK for completely unreconstructed 'spotters') was fitted with an experimental Head Up Display and a collimated FLIR, intended to give the driver an improved view ahead at night, or in conditions of reduced visibility. The *Nightcat* and *Prometheus* teams examined each other's

Top cat — the most advanced fighter aircraft flying in Britain today? Don't be fooled by appearances, XX833 can be equipped with an operational helmet-mounted sight, ASRAAM, TRNS and TIALD.



systems, and discussed problems they had encountered, and some of the *Nightcat* personnel drove the experimental Jaguar, before the two vehicles were posed for publicity photographs. The system proved useful, especially for detecting warm objects (particularly other vehicles and pedestrians) before they would have been 'picked up' visually or in the car's headlights. Perhaps one day we will all be driving cars equipped with HUDs and FLIR!

The GEC TIALD (Thermal Imaging Airborne Laser Designation) pod had proved extraordinarily successful during Operation 'Granby', even though it was deployed only in prototype form, on five aircraft hastily converted even as war broke out. Designed as a system to be used by the back-seater of a two-seat aircraft, TIALD was impressive enough to prompt the question 'Could the system be used safely in a single-seat cockpit environment?' This question was prompted by the desire to integrate TIALD on Eurofighter (and perhaps also on the Harrier (GR7) and certainly not on the ageing Jaguar. Initially developed using DERA's *Nightbird* Buccaneer, there was soon pressure to at least fit-check TIALD on XX833. This aircraft was chosen because one of its cockpits could very easily simulate a generic single-seat cockpit, while a safety pilot could be carried in the other seat. For the 1990 Farnborough SBAC show, the aircraft was displayed in the aircraft static park with TIALD below one wing, and was briefly configured with Atlantic below one wing and TIALD below the other.

The decision to use the aircraft for flight trials was a logical one and in 1991 DRA was tasked by the MoD's Operational Research branch to undertake a trial to establish the limitations for single-seat operation of TIALD. Thus, between November 1992 and August 1993, XX833 flew an 81-trip single-seat TIALD technology demonstration programme. This proved that the system could be used safely in a single-seater, by day or night, allaying fears that loss of situational awareness and target fix-

ation would present unacceptable flight safety hazards. These were very real fears, since the US Air Force had lost two LAN-TIRN-equipped F-16s as a result of pilot display fixation, and since TIALD was a complex piece of equipment with a range of some 30 modes/options of operation.

XX833's TIALD fit was experimental in nature, rather than operational, but was optimised to explore the system's operational and tactical potential. TIALD operation was automated as far as possible, and was made as intuitive as possible, while display formats were carefully tailored to be easy-to-read and easy to interpret. TIALD operation was achieved using HOTAS (Hands on Throttle and Stick) — or more accurately Hands On Hand Controller and Stick — controls. The aircraft received a new CRT Head-Down Display screen and a hand controller in the rear cockpit, together with Tornado F3 (F/A-18)-type stick-tops, GPS, a video processor and a computer symbology generator. The hand-controller was redesigned during the trials, while TIALD sightline pointing accuracy was enhanced and HUD and display symbology was redesigned and refined. By the end of the trial it was clear that with the addition of a Ground Proximity Warning System and adequate displays, the system could easily and safely be used by front-line pilots in a single-seat environment.

Insofar as TIALD is concerned, the rest is, as they say, history. The success of the *Nightcat* Jaguar's single-seat TIALD programme was remembered when the RAF found itself urgently looking for extra laser designation platforms for use over Bosnia. The Tornado and Jaguar were the RAF's original preferred choices, but the *Nightcat* project allowed the Jaguar to be considered as an option, and it soon became clear that the older type was a better choice. (TIALD integration on the Tornado was already underway, and could not easily be speeded up, while the Harrier force was busy enough working up in the night attack role and in integrating other systems, weapons and equipment). Accordingly the *Nightcat*'s single-seat TIALD trial fit was 'productionised' by the DRA to form the basis of the UOR Jaguar GR1B, as described in the May 1998 issue of *Aircraft Illustrated*.

But the successful conclusion of the single-seat TIALD programme was far from the end for the *Nightcat* Jaguar, which has continued to fly (at Boscombe Down) fairly intensively in support of the ongoing Jaguar upgrade. Before leaving Farnborough, the aircraft was fitted with a GEC Helmet-Mounted Sighting system, replacing XX835 as the primary HMS R&D aircraft. The aircraft has been upgraded to (and beyond) Jaguar 96 standards, with provision for

ASRAAM underwing, and with a tiny GEC LI TV in front of the HUD and a new Sextant Avionique LCD display in the rear cockpit.

Since its transfer to Boscombe Down, XX833 has played a major role in the Research and Development effort behind the RAF's ongoing Jaguar upgrade, flying prototypes of many of the new systems and avionics incorporated in Jaguar 96 and 97. But quite apart from directly Jaguar-related tasks, the *Nightcat* Jaguar has continued to be one of the UK's most useful and significant research and development platforms. However, the aircraft suffered considerable damage in a birdstrike on 25 February 1998. A small part of the bird went down the port engine, but 90% penetrated the skin below the armoured windscreen. The resulting rebuild kept the aircraft out of the air for four months. It is currently flying in the first captive trials of the new ASRAAM missile in its digital form, with an instrumented round mounted on a Common Rail Launcher under the starboard outboard underwing station. An AIM-9 is carried opposite, on the port outer station. Run by DERA's Cockpit Displays Group, the current trial has seen ASRAAM being used in conjunction with the GEC Helmet-Mounted Sight now being procured for the Jaguar. This allows the missile to be aimed at extreme off-boresight angles, giving what DERA test pilots describe as an 'awesome capability'. With an operational helmet-mounted sight, ASRAAM, TRNS and TIALD, XX833 could justifiably be described as the most advanced fighter aircraft flying in Britain today — not bad for a 'knackered old Jaguar'! In fact, as these words were written (early March), XX833 was being fitted with IDM (the revolutionary new Improved Data Modem), which promises to be a 'poor man's JTIDS' and which is already showing great promise in tests on US Air Force F-16s.



Above: Jaguar T2 ZB615 still wearing its famous 'raspberry ripple' scheme, but now carrying Empire Test Pilots School titling.



Left: Another Boscombe resident is XX833, now part of the Strike Attack Operational Evaluation Unit.

BOSCOMBE CATS

Jaguars remain a vital part of the long-term test fleet at Boscombe Down, although the permanently assigned aircraft represent only a proportion of the Jaguars on charge during any particular year. The aircraft transferred from Farnborough (XX833 and ZB615) augment the Jaguar T2 (XX145)

which was already assigned to the Empire Test Pilot's School for test pilot training. The latter currently represent the unit's only supersonic aircraft type. The ETPS Jaguars occasionally fulfil other duties, principally as high-speed photo chase aircraft. Front-line Jaguar aircraft are loaned to Boscombe Down's various sub-units on a regular basis, sometimes for fairly short periods of time. During 1997, for example, at least 12 Colishall Wing Jaguars were noted operating from Boscombe Down for brief periods.

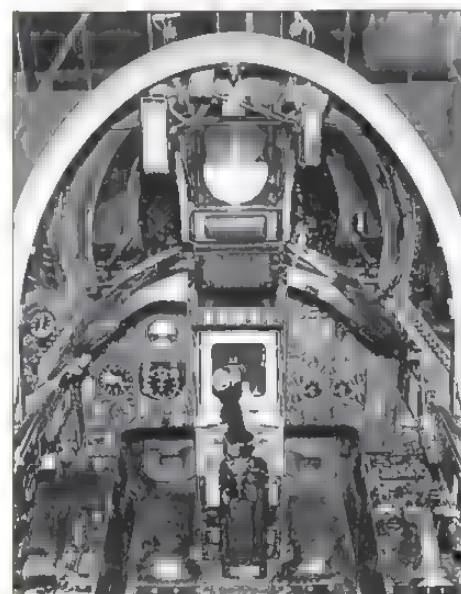
One of the principal users of the Jaguar at Boscombe Down is the Strike Attack Operational Evaluation Unit. Part of the RAF's Air Warfare Centre (headquartered at Waddington), the SAOEU's task is one of developing tactics and procedures for the front-line, 'writing the book' on how to exploit particular equipment, systems or weapons for the front-line. The unit also undertakes trials (post-Release to Service) to ensure that new equipment actually works 'as advertised' under operational conditions. The SAOEU fleet is divided between the front-line types it 'represents', with three or four Harrier GR7s, three Tornado GR1s (including 1As and 1Bs) and a single Jaguar (though as with the other types, extra examples may be borrowed from the front-line and may sometimes be painted up in SAOEU markings). When the SAOEU deployed en-masse to NAS China Lake in late 1997, it took a pair of Jaguars.

sion, but in fact completion of the PI aircraft was delayed until the TI aircraft had virtually completed its initial flying trials.

But while converted to Jaguar 97 standards, XZ399 (the TI aircraft) looked for all the world like a normal Jaguar GR1A (Jaguar 96), wearing full No 6 Squadron markings and the code 'EJ'. For its first post-conversion test flight, the aircraft even lacked the overwing missile launch rails which often distinguish the Jaguar 96. This maiden flight occurred on

4 August 1998, with Wg Cdr Andy Young, OC Fast Jet Test Squadron, at the controls. The aircraft was formally handed over to the RAF for Military Aircraft Release trials on 28 January 1999, though these will primarily be flown by the full-standard Proof Installation aircraft, XX116.

Aircraft Illustrated will bring its readers a report on the progress of Jaguar 97 when it completes Military Aircraft Release testing, when it will become Jaguar GR3A.



The rear cockpit of XX833, fitted with initial modifications. Note the new HUD, Head-Down CRT screen and hand controller (right hand console).

AIR MART

AI's review team casts a critical eye over the latest books, videos, 'flight sims' and models to hit the shelves

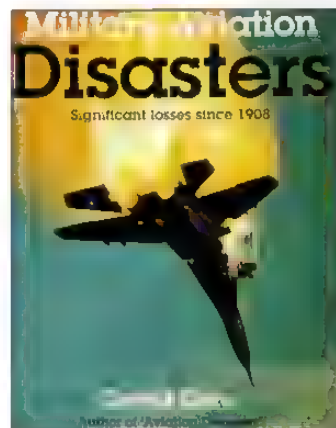
AIR Books

Books reviewed by
Denis J. Calvert

Military Aviation Disasters. Significant Losses since 1908

by David Gero. Published by PSL
(176pp. H/B) at £19.99
ISBN 1-85260-574-X

The front cover depicts the dramatic ejection of a Russian pilot from his burning MiG-29 following a mid-air collision at Fairford in 1993, and the back cover the three-ship impact during the *Frecce Tricolori's* cross-over manoeuvre at Ramstein five years earlier. The first accident was spectacular but fortunately without injury to pilots or spectators; the latter resulted in hundreds of injuries and fatalities, and has had a lasting effect on display rules



and safety procedures at airshows worldwide. If the introduction's justification for inclusion in this volume seems a bit ghoulish — 'I have attempted to include every individual incident with at least 20 fatalities, although certain cases with a fewer number of casualties have also been recounted where they are particularly noteworthy' — this is perhaps inherent in any volume with such subject matter. However, this also explains why

the MiG-29 accident featured on the front cover is not actually detailed inside! Each accident is given a couple of hundred words of description, with many also illustrated (some a charred wreck, some the 'moment of impact', some merely a representative flying shot, along with the odd shot of a deflated airship). While reports are generally objective and unemotive, phrases such as 'plummeted to earth in flames' (C-123K, 6 March 68, p97) and 'slammed into the mountain' (three HS125s, 26 May 71, p107) might be seen as unnecessary. Not recommended for whiling away the hours in an airport terminal, waiting for your flight to the sun!

Spitfires and Polished Metal

Restoring the Classic Fighter by
Graham Moss and Barry McKee.
Published by Airfile (144pp, S/B)
at £16.95
ISBN 1-85310-720-4

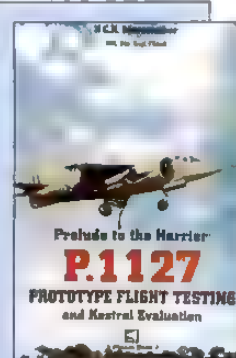
The first of this month's picture books in the familiar Airfile 'square format', *Spitfires and Polished Metal* covers broadly familiar ground, but in a nonetheless entertaining manner, concerning itself solely with restored aircraft. While the volume inevitably includes a chapter 'Design and Engineering Differences' which attempts to define the major differ-

SPITFIRES AND POLISHED METAL



ences and improvements which were introduced between the prototype K5054 of 1936 and the final production post-war F24, it also devotes space to the more esoteric aspects of 'Test-Flying the Spitfire'. Given such a photogenic subject, much of the interest is photographic, covering in particular the rebuilt and restored aircraft coming off the 'production line' of 'Historic Flying' at Audley End. Both in terms of technical quality and originality, some of these shots really do stand out from the ordinary. This softback and primarily photographic book is clearly not — and not intended to be — any competitor to Morgan & Shacklady's *Spitfire: the History*, which will surely remain the definitive work. It is, however, original and well-written, and a welcome addition to the published works on the type. **

perfect an inflatable wing for the recovery of the Gemini space capsules. That this programme was ultimately unsuccessful is irrelevant; this is a fascinating story and well told by the Dutch author. Photo reproduction in this volume is better, and can fairly be rated 'good'. *Eric Genders* was one of Britain's post war test pilots, joining RAE Farnborough after the war, and serving under the legendary Lt-Cdr E. M. 'Winkle' Brown. Sadly, Genders' flying career was cut short by the crash of DH108 TG263 on 1 May 1950. This was the third fatal accident with the type, and — since only three examples had been built — marked the end of the DH108. A well-written account of a pilot's 10 years of flying, albeit with a tragic end. Photo reproduction is varied, but in general can be classed as 'decent'. As its title suggests, *5 American X-Planes* features experimental aircraft of the post-war period — Bell X-1 (of Chuck Yeager and first supersonic flight fame), Bell X-2 (its swept-wing development for speeds of up to Mach 3), the fabulous (but frankly under-powered and under-performing) Douglas X-3, the little-known Northrop X-4 and the variable geometry Bell X-5. But as well as being the story of the aircraft — all of which probably justified descriptions of 'fantastic' and 'futuristic' in their time — there is the interwoven story of their test pilots. Well-known names such as Frank Everest and Joseph Walker appear alongside less 'well-knowns' such as Charles Tucker. As related, too many died testing these and other 'aircraft of the future'. Since it covers a relatively larger subject, this volume is shorter on detail, but is well-written and fascinating. Photos are varied and quite well reproduced. If there is one regret, it is that these titles are expensive in the UK. Against this, they are highly individual, well produced, come with your reviewer's recommendation and are well worth searching out. ***



• X-Planes Book 3: Prelude to the Harrier — P1127 Prototype Flight Testing and Kestrel Evaluation

by H C H Merewether. Published by HPM Publications (120pp, S/B)
at US\$50

• X-Pilots Book 3: Eric Genders. Legendary Fighter Ace and Test Pilot

by Pauline Shacklock. Published by HPM Publications (40pp, S/B)
at US\$20

• X-Planes Monographs 3: Paraglider. Land Landing for Gemini

by Ed Hengeveld. Published by HPM Publications (32pp, S/B) at US\$20

• X-Planes Pictorial 3: 5 Great Postwar American X-Planes

by Henry Matthews. Published by HPM Publications (32pp, S/B)
at US\$20

No ISBN numbers. All available from Duncan Simpson, Springhill, 7 Longdon Road, Guildford, Surrey GU4 8PP. Prices quoted include P&P (airmail from Beirut)

A batch of new titles from Henry Matthews in Beirut — four volumes from four different series and in three different formats. All are welcome, particularly since each covers its own, esoteric post-war subject. The *P1127* volume is the only one in large format (275mm x 195mm with colour laminated covers) and is written by Hugh Merewether, who flew the *P1127* and its derivatives from 1960 to 1970, ending up as Hawker's Chief Test Pilot at Dunsfold. This title is detailed, technical, well illustrated and evocative, and includes detailed flight logs covering the test programmes of *P1127* and *Kestrel* aircraft. If there is any criticism of this volume, it is that better paper would have allowed clearer (sharper, with better tones) photo reproduction; as it is, picture quality is 'fair to decent'. *Paraglider* covers a yet more way-out subject — the development programme to



Pacific Glory. Airlines of the Greatest Ocean

by Freddy Bullock. Published by
Airfile (112pp, S/B) at £16.95
SBN 1-85310-953-3

The blurb on the back cover of this, the second of this month's Airfile picture books, indicates well the contents of the volume — 'The liveness of the airlines that span the skies above the world's greatest ocean are as colourful as the islands and shores of the Pacific. Escape into a paradise of blue seas where the airports are filled with tiny island hoppers and intercontinental giants...'. This paragraph — of which I quoted around half — is about all the text you get in this well-printed volume. The rest comprises good if unremarkable colour photos of airliners in strange (to those whose normal spotting haunts are LHR or LGW) and even exotic liveries, printed one or two to a page and with (typically) 20-word captions. A surprising (disappointing) number of these aircraft are shot on the ramp or taxiway; few are seen in the air, although the familiar backdrop of the approach to Hong Kong's Kai Tak is discernible in several photos. *

Also Received:

Rolls-Royce Heritage Trust
Historical Series No 26: **Fedden — the Life of Sir Roy Fedden** by Bill Gunston. Published by the Rolls-Royce Heritage Trust (350pp, S/B) at £15.00 (including P&P, from the Trust — Richard Haigh, Rolls-Royce Heritage Trust (ML-1), PO Box 31, Derby DE24 8BJ). SBN 1-872922-13-9

This combination of subject and author, in a well-produced volume with excellent photo reproduction, guarantees a good and authoritative read on the subject of the man 'a Titan', as Bill justifiably describes Fedden in his Preface and the Bristol Engine Department at Filton. Highly recommended, and good value. ***

Last Talons of the Eagle by Gary Hyland and Anton Gill. Published by Headline Book Publishing Ltd (280pp, H/B) at £18.99
ISBN 0-7472-2156-1

Video View

The Vulcan Story
from the Leading Edge Collection.
Running time 57 min

Only the Lightning amongst British post-war aircraft has the same kind of charisma as the Vulcan. *The Vulcan Story* opens with some good long-lens footage of a B2 touching down and going around. Then it diverges (I was tempted to say 'loses its way') into images of people with umbrellas in the rain, a shot of a dog and on to a sequence of a man cleaning a 20ft span (?) model Vulcan in his back garden. Clearly, this is the early 'nineties and the 'Save the Vulcan' campaign, which aimed to persuade the MoD to keep Vulcan B2 XH558 on the display circuit. The model B2 is seen being paraded in front of the Houses of Parliament. Raymond Baxter is interviewed, and expresses his support for the campaign. Sadly, it failed. Then a flashback to a 'Cold War' practice scramble in hazy conditions — impressive, but a pity about the weather. 23 March 1993 and XH558 makes its last flight, from Waddington to Bruntingthorpe and retirement. Shots of the final landing and the taxi in — while people wander in front of the lens. Donald Wood, from the Vulcan design team, runs instructively through the type's salient points. Back to the beginning. Shots of the A V Roe wind tunnel testing, and the Avro 707 delta built to test the flying

characteristics of the delta wing. Roly Falk talks to the camera from the cockpit of a red 707A — Falk is the man who rolled the Vulcan and ensured his place in the history books (try doing that in a B-52). Footage of a full-scale Vulcan mockup — which your reviewer hadn't seen before — and of structural tests. Then it's 30 August 1952, when the prototype VX770 made its first flight from Woodford. Good footage including take-off and air-to-air. A worker relates how this flight 'stopped road traffic in the whole of Cheshire'. Three days later, VX770 displayed at Farnborough. The story of production of Vulcan centre-sections at Chadderton, and their transport by road to final assembly at Woodford, which took place by night and required the provision of hinged lamp posts on the A61. Then the transition from pure to cranked delta and artist's impressions of the proposed Atlantic jetliner, with Vulcan wing planform and extended fuselage — and passenger capacity increased from 5 to 131. Film of Roly Falk rolling a Vulcan — stupendous. A bonus of nice air-to-air of two No 74 Squadron Lightning F1s, as a test pilot relates how the Vulcan could out-turn them, and suggestions that the big delta had exceeded Mach 1. More good air-to-air of Vulcans — didn't they look better in white? An ex-Vulcan crewmember relates how he escaped by parachute from the cockpit of XA891 after electrical problems and a flat spin. His was the first complete crew to escape in this way, the only reference in the video to the long-standing complaint that only the two pilots in the Vulcan (and Victor and Valiant) had

the luxury of ejector seats. A shot of the fin of preserved XM603 of the '603 Club' at BAe Woodford, which has the words 'AVRO VULCAN' helpfully painted in red across it. The 603 Club aims to keep the aircraft 'in reasonably good order' but not in flying condition — a task that the commentary describes as 'never ending'. This is a wonderful effort by a core team of 20, 'all of them 40-year men'. One team member relates the 'mountaineering act' of replacing a rudder on the aircraft. Pride in their achievement is evident and justified — 'we built all 138 Vulcans'. The video ends with a five-minute Vulcan retrospective, from 1947 to final service retirement at Scampton in 1984 and the 'Indian summer' of XH558 to 1992. A fascinating collection of reminiscences and images. The commentary is unobtrusive and informative, the soundtrack competent and the film sequences mainly good but including some of more doubtful technical quality — which is hardly surprising when the earliest go back nearly 50 years. Pure nostalgia, and recommended. You'll never see Vulcan in the air again. Will you? So *The Vulcan Story* is arguably the next best thing. *** DJC

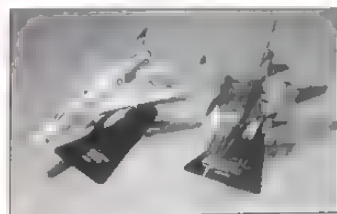


NEW Products

Models to die for

Last month we introduced the new Armour Collection of die-cast models with the promise that we would be taking a closer look at some of these excellent metal replicas in a future issue. Well, here we go! First under the spotlight are four of the 1:100 scale offerings, the F-15, A-4M Skyhawk and a couple of F-100 Sabres. The F-15 is probably the most impressive of the three in terms of its sheer size — we found the A-4 hiding under it! Supplied with four Sparrow missiles and four 'winders, the jet supplied carries the 50th Anniversary markings of





this desktop replica, priced at around £19.00 is a simply great addition to the top of your i-Mac.

Moving on to the F-100, the two examples supplied are US Air Force versions — one in a silver 481st Tactical Fighter Squadron scheme and one in classic Vietnam

green-green-brown. The silver aircraft is gloss, with very detailed decals. A refuelling probe protrudes out from the wing and it carries the groovy curvy drop tanks and four early Sidewinders so typical of the 'Hun'. The 'camo' jet is matt and carries the same warload — representing Super Sabre 56918. The Sabre is also available in French ('camo', sharks-mouth and silver) USAF Skyblazers and Thunderbirds colours, as well as another USAF silver scheme. The shape on

this jet is again superb, with nice thin wings, delicate canopy with grey 'bang seat' in situ and weathered jet pipe. Sitting next to each other, the appeal of this collection is widened — you can feel a 'want to build a set' emotion coming on.

Not much space left to talk about the Skyhawk — suffice to say that Heinemann's Hot Rod is resplendent in its Marines 'Blacksheep' scheme of VMA-214. Two rocket pods hang from the wing and the two-tone grey is even feathered

round the edges. On this one, the shape is less accurate than the other two (but only by minutiae), and the Scooter lives on thanks to this die cast miniature. Price? Around £15, and sure enough, there are eight A-4 schemes and types to choose from, including an Israeli version which we will take a look at in future reviews.

Check-out the extensive Armour Collection range at Collectors Aircraft Models at the Sheraton Skyline Hotel (Tel: 0181 754 7281). ***JD

FLIGHT Sims

747 International Pack (for Microsoft Flight Simulator 98)

by Data Becker, available from Data Becker UK (Tel. 01420 22707) at £19.95

This add-on package for *Flight Simulator 98* is the latest version of Data Becker's popular 747 package but differs significantly from the original. The CD-ROM offers no less than 66 Boeing 747s in the liveries of 30 airlines, complete with instrument panels and realistic sounds. Alongside these come two additional scenery areas, along with maps for *Flight Simulator*.

In truth, many will view this package as merely offering one new aircraft for *Flight Simulator*, albeit in 66 different colour schemes, but a closer look reveals the amount of hard work and research that has gone into this product. Three variants of the Boeing 747 are offered with this package — the B747-100, B747SR and B747-200, although externally it is very difficult to distinguish any difference between these in this package. It is a pity that Data Becker did not include other B747 variants such as the B747-300, B747-400 and B747SP with this new version. However, great care has been taken over the handling, modelling, colour schemes and visual details of the aircraft in this package, with landing lights and even solid tyres on the undercarriage now being included as a direct result of feedback from customers. A wide range of colour schemes is offered — Virgin Atlantic, BOAC, British Caledonian, Qantas, Iberia, American Airlines and British Airways to name but a few. Two British Airways colour schemes are offered but sadly not the latest variant.

Along with the aircraft come some excellent instrument panels that, in

comparison with photographs of the real thing, are extremely realistic. There is even a flight engineer's panel and all come with a host of working instruments, switches and dials. Once you have chosen which aircraft to add to *Flight Simulator*, the interface ensures that both panel and aircraft are correctly installed without further fuss.

The previous version of this package provided a real challenge to the *Flight Simulator* pilot when it came to flying the B747 and this new version continues in the same vein. Not being a B747 pilot, the reviewer is not in a position to be authoritative about it, but the B747 in this package handles much as you would expect for a big jet and it will take plenty of training before you will feel totally confident about flying it! For those who wish to be totally realistic, the appendix to the impressive manual included with this package has a mass of checklists and other information related to flying the B747. The manual also has extensive (and necessary) information about the dials, buttons, switches and other displays presented on the instrument panels. Before you fly the B747, you may find a thorough read of the manual to be very useful!

In addition to the aircraft, this package comes with two extra scenery areas for *Flight Simulator 98*. The first is a detailed model of Geneva airport produced with the help of the airport's technical director. Visually this looks very impressive, right down to the docking gates at the terminal. The other scenery included is Justin Tyme's Delaware, Maryland and Washington scenery, which includes over 100 airports and other landmarks. Despite the packaging on the box stating that this scenery offers 'unrivaled detail', this was not found to be the case for Washington DC itself — the default *Flight Simulator 98* version is better! Elsewhere, Justin Tyme's excellent product is a significant improvement. An updated version of this scenery is also available (as *delmarva98x.exe*)

from Justin's FS Genesis web site, <http://www.fsgenesis.com>.

As with the earlier version of this product, 747 International Pack comes with an excellent 121-page manual which gives plenty of background to the Boeing 747 and more about the add-on sceneries. Unlike the original, this version does not come with videos and images of B747s on the CD-ROM which is a little disappointing as these were seen as a nice extra on the former product.

In conclusion, this is an interesting package and reasonably priced. For the large number of B747 enthusiasts, this will be a much used addition for *Flight Sim-*

ulator, providing new challenges and extra airfields. Others may find the limited number of different B747 models less of an appeal, but the quality and detail of the models in this package is excellent. *** HC

Boxed item to read
Many of the book reviewed here can be ordered from the Ian Allan Bookshops at:
• 45/46 Lower Marsh, Waterloo, London SE1 7SG (Tel: 0171 401 2100)
• 5 Piccadilly Station Approach, Manchester M1 2GH (Tel: 0161 237 9840)
• 47 Stephenson St, Birmingham B2 4DH (Tel: 0121 643 2496)

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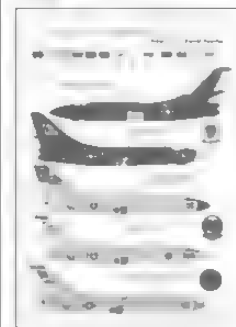
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SHOW-BIZ

MARK ASHLEY brings us the latest news on the airshow scene

North Weald debutants

No, this does not refer to North Weald 99's 'Women in Aviation' theme, but to the six new airshow acts giving their first British displays this year. The biggest new treat will be the fiery finale provided by a piston-powered strafe attack on North Weald by two Curtiss P-40 Kittyhawks, the first time a pair of these American warbirds have been seen giving such a display in the UK.

The two fighters are from the Fighter Collection and the Old Flying Machine Company at Duxford, and will be accompanied by as-big-a-pyrotechnic display as was provided at North Weald last year when the Strikemaster Duo made their debut.

Two very unusual aircraft types — both with German connections — which will give their British mainland first-shows are the ex-Luftwaffe Rockwell OV-10B Bronco, now French-owned, and the extraordinary Dornier Do-C-36 Altenrhein, both of which had military careers as

target tugs. Nicknamed the 'Schlepp', the Do-36 served with the Swiss Air Force and is being operated under the Intrepid Aviation Company banner which organises the North Weald 99 airshow.

Also pairing up is a one-off 'Black Jet' display duo, the brainchild of display organiser, Brendan Walsh. For the first time, airshow audiences will see a black Hawker Hunter (Delta Jets) and black Folland Gnat (ex-McCarthy Aviation, now under new ownership) performing a 'Synchro'-style act. The new Jungmann Pair of biplanes will be making their debut, while Vic Norman of Aerosuperbatics has agreed to give a first-time demo of an aircraft landing on a trailer towed behind a truck — a Bellanca Citabria is being used for this daring stunt.

Coming first in the season of airshows, North Weald is the ideal venue for new airshow acts to take the stage. North Weald 99 is set down for Sunday 16 May.

To fully enjoy the splendour of the event, why not become a VIP for the day? By buying a special ticket, you will receive the full

WIN TICKETS TO NORTH WEALD 99!

In association with The Intrepid Aviation Company Ltd, *Aircraft Illustrated* is pleased to be able to offer readers the chance to win tickets to this exciting airshow. We have 10 adult tickets up for grabs!

HOW TO ENTER:

All you have to do to stand a chance of winning a ticket is send name and address details to: Ian Allan Publishing Ltd, Marketing Dept (NW99), Riverdene Business Park, Molesey Road, Hersham, Surrey KT12 4RG. The closing date for receipt of all entries is 30 April 1999.

RULES: Entries are restricted to one per household. Employees of the publisher, plus their immediate families are not eligible to enter. The winners will be notified by post. No cash alternatives can be given in lieu of the prize. The Editor's decision is final and no correspondence can be entered into.

VIP treatment which will grant you the following: VIP car pass for a dedicated route and entry into the show; a dedicated car park; a personalised pass for the VIP enclosure — including a licensed bar; luncheon included with teas and

coffee on arrival and opportunities to meet the pilots/celebrities. All of these advantages are available for £50.00 per person. Please contact Allison at Intrepid Aviation on 01992 524233 to reserve your special VIP pass.

The Breitling fighters

The Old Flying Machine Company (OFMC) at Duxford has secured a beneficial deal with world-famous Swiss chronograph manufacturer, Breitling — fresh from sponsoring a global orbiter of the hot-air variety — to support a unique World War II Fighters Aerobatic Team.

Named the 'Breitling Fighters', the team will comprise four warbirds drawn from the OFMC fleet. Expected types to be used are the Spitfire IX, Me-109J, Hawker Fury, Corsair, P-40E Kittyhawk and P-51D Mustang. The 'Breitling Fighters' will be able to draw upon a very strong cadre of experienced display pilots, led by father and son OFMC directors, Rae and Mark Hanna. The 'Fighters' aircrew comprise Andy Gent, Nigel Lamb, Keith Skilling, Brian Smith, Alan Walker and AVM Cliff Spink.

An additional solo act being supported by Breitling for the airshow circuit is OFMC's Czech-built Aero L-39ZO Albatros jet trainer which, reportedly for no other reason than that it will look impressive, is being painted for the 1999 airshow season in a 'US Navy aggressor-type scheme'. The 'Breitling Fighters', however, will carry authentic WWII colours and codes, with a small Breitling crest just visible below the cockpit canopy sills.

It is believed this is the first time such a varied mix of warbirds in size, power and performance will have been flown as a full-scale aerobatic team anywhere in the world. The 'Breitling Fighters' will be conducting a full European tour this summer, taking in airshows in Austria, France, Germany, Northern and Southern Italy, Spain, Switzerland and the UK. They will be spending the entire Paris Air Show week at le Bourget from 13-20 June. The team is booked for the Biggin Hill Air Fair in Britain the following week-end.

Team sheet

The following teams are expected to display in Britain this summer:

Apache Aviation (France, 2x PC-7)

Southend 31 May
Woodford 12 June
Cosford 13 June
Biggin Hill 26-27 June
Waddington 26-27 June

Biele Albatrosy (Slovak AF, 7x L-39)

Fairford 24-25 July

Frecce Tricolori

(Italian AF 10x MB-339)

Mildenhall 29-30 May

Cosford 13 June

Fairford 24-25 July

Iskry (Polish AF 6/9x Iskry)

Fairford 24-25 July

Patrouille de France (French AF 8x Alpha Jet)

Waddington 26 June

Patrouille Suisse

(6x Swiss AF F-5E)

Waddington 26-27 June

Royal Jordanian Falcons

(Jordan, 4x Extra 300)

Cosford 13 June

Biggin Hill 26-27 June

Fairford 24-25 July

Test Pilots (Russia, Su-27/Su-30)

Biggin Hill 26-27 June

Waddington 26-27 June

Thunderbirds (USAF 6x F-16)

Mildenhall 29 May

Cosford 13 June

Fairford 24-25 July

Ukrainian Falcons

(Ukrainian AF 6x MiG-29)

Fairford 24-25 July

Canberra's half century displays

It's going to be a good year for fans of the world's first operational jet bomber, the English Electric Canberra, which has become a 'half-centurion' in 1999. The last RAF unit to operate this famous jet, No 39 (1PRU) Squadron, is planning something special for the airshow circuit this season, to celebrate the Canberra's golden jubilee.

Based at RAF Marham, Norfolk, the squadron flies the last five Canberra PR9s in service on photo-reconnaissance duties. Examples of the PR9 are certain to feature at most of the UK's major military airshows in 1999. Also on strength are two Canberra T4 trainers — it is one of these aircraft which will be most sought after by enthusiasts this summer.

The T4 is to be repainted during April by Flight Refuelling at Bournemouth International Airport in an accurate representation of the original Canberra prototype's all-over light blue colour scheme. The jet will then be exhibited at the special British Aerospace-organised

Canberra 50th anniversary event at Warton on 13 May, where it will join a line-up of English Electric's best-sellers, comprising two PR9s, a TT18 from DERA Llanbedr and Classic Aviation Project's world altitude record-breaking B2/6 WK163. At 11.46hrs, the same moment when the prototype Canberra first got air under its wheels 50 years ago, the representative T4 will re-enact that historic flight accompanied by a Vampire T11 chaseplane.

Regrettably this is not a public event and is restricted to an exclusive 250 VIP guest list of ex-Canberra crew. British Aerospace are hoping that the Canberra's brilliant test pilot, Roland Beament, will be well enough to attend — sadly he is now suffering from leukaemia.

Enthusiasts will, however, get their chance to see the 'prototype' Canberra in close-up: at the RAF Waddington At Home Days and the RAF Fairford Royal IAT 99 (dates in 'Air Events'). These are the only two airshows the T4 will appear at before it is again re-sprayed, this time in RAF gloss black training scheme. The No 39 (1PRU) Squadron display crew are Sqn Ldr Terry Cairns and Sqn Ldr Brian Cole.

Airshow briefing

The 'Show-Biz' airshow planner for aviation enthusiasts, with dates, venues, timings, prices and aircraft participation all listed where known. These details all come direct from the airshow organisers themselves and therefore provide the most accurate forecast available from any source. However, while all details published here are believed to be correct at the time of going to press, changes and cancellations can occur at short notice. Readers are advised to check with airshow organisers about any event, using the contact numbers published below.

SHUTTLEWORTH SPRING AIR DISPLAY (Sun 2 May)

Venue: Old Warden Aerodrome, Biggleswade, Bedfordshire

Gates: 10.00hrs

Flying: 14.00hrs

Prices: Driver only £9, driver + 1 pax £15, driver + 2/4 pax £22

Info Line: 0891 323310

Contact: General office 01767 627288

As always, the Shuttleworth Collection helps to get the British airshow season off to a nostalgic start with its Spring Air Display on May Bank Holiday Sunday. On display from the Collection itself will be the Avro Tutor, Miles Magister, Tiger Moth, Hawker Tomtit, Hawker Hind, Gloster Gladiator, Lysander and, if conditions permit, the Avro Triplane, Bleriot XI and the Deperdussin towards the end of the day. The RAF is sending the BBMF Lancaster, Hurricane and Spitfire trio for

STOP PRESS. STOP PRESS. STOP PRESS

As *AI* went to press, it was announced that The Lambert and Butler Eclipse International Airshow to be held at RAF St Mawgan on 11 August has been cancelled, as well as the preceding Lambert and Butler Light Experience Fly In on 10 August. More details on the reasons behind the decision to cancel this huge event will be carried next month.

Display slots

● A spokesman from British Aerospace's sales and marketing exhibitions group informs 'Show-Biz' that any appearance this year at an airshow by a Eurofighter Typhoon development aircraft is dependent entirely on the multi-role combat jet's flight test programme. If either of the British Typhoons do appear, it will be on the back of a flight test and will not involve any high G manoeuvres. A single 'three-sixty' and up is all UK airshow audiences are likely to see. RAF Fairford's Royal IAT 99 seems favourite to witness a Typhoon appearance, although this is not confirmed. A BAe spokeswoman for the exhibition

planning of British Eurofighters DA2 and DA4 says it will be one of the partner countries' aircraft which will appear at the Paris Air Show in June, again if flight tests permit. British Aerospace is looking long-term towards sending DA2 to the Dubai 2000 airshow in November, but this will involve a major logistics support exercise — including aerial tanking by RAF VC10.

● The re-structured Jet Heritage Collection at Bournemouth International Airport is pioneering three new Flying Days this summer. The events will be devoted to most of Jet Heritage's fleet but with some guest performers taking part. The Collection's workshops and new museum will also be open to view. 'Show-Biz' is informed that the display line and axis will afford excellent take-off shot opportunities, with the sun right behind the photographer — at last an airshow which understand the cameraperson's needs! The Jet Heritage Flying Days are set down for Sundays 6 June, 8 August and 26 September.

● The RAF's Red Arrows have a new opening manoeuvre for their 1999 airshow season. The team now approach from 'crowd left' in a 'Canopy Bend' formation fly-by, deliberately posed for photographers to capture all nine Hawks in a much sought-after top side shot.

● The XM655 Maintenance and Preservation Society is pleased to announce a fast taxi run of Vulcan 'XM655' on Sunday 25 April 1999 at Wellesbourne Aerodrome, near Warwick. This is XM655's first of two public taxi runs of 1999 and all profits from the event will be used to maintain this majestic V-Force bomber in taxying condition. Gates open at 11.30hrs and the aircraft's engines will be tested to maximum effect prior to the fast taxi at 14.00hrs. For more information, call the recorded information line on 01252 650771.

Thunderbirds' historic visit

In the 50th anniversary year of NATO the United States Air Demonstration Team, the Thunderbirds, are planning to make an historic pilgrimage to the country where the alliance was first called into full-scale, live-fire military action — Bosnia.

The team is arranging to display at Tuzla and Sarajevo, scenes of some of the most devastating fighting between the Croatian Muslims and the Bosnian Serbs during the break-up of the former Yugoslavia earlier this decade. NATO eventually was called into action again in Kosovo to implement the United Nations' mandate for peacekeeping forces, which may obviously change things.

Should it go ahead, the Thunderbirds' display in Bosnia should crown a very special visit to Europe during this important anniversary year. The team will also be the star attraction at RAF Mildenhall's Air Fete 99 on Saturday 29 May, which has the NATO Golden Jubilee as its principle theme. The following day the 'Birds depart on a long trans-Atlantic flight home, in readiness for their annual display at the US Air Force Academy three days later.

Thunderbirds European itinerary

(Correct as at 22 March, but 'not yet in stone' — T-Birds Public Affairs Office)

19 May	Azores	Lages
21 May	Italy	Aviano (not public)
22 May	Czech Republic	Venue undecided
24 May	Bosnia	Tuzla (not confirmed)
25 May	Bosnia	Sarajevo (not confirmed)
29 May	UK	RAF Mildenhall

EXCLUSIVE COMPETITION



LONDON to PARIS with Eurofighter Typhoon

We can't offer you a supersonic flight but we can get you close with this fantastic competition prize supplied by our friends at Eurofighter Typhoon, exclusively for readers of AIRCRAFT ILLUSTRATED

This June, Paris will be brimming with aircraft enthusiasts and industry representatives from all over the world as the 43rd Paris Airshow takes place. The show will have over 230 aircraft on display and looks set to be one of the most impressive ever. As a result, entry to Le Bourget airport between 13-20 June has to be this year's hot ticket.

Capable of speeds over 1,500mph, Eurofighter Typhoon can travel from London to Paris in only 8 minutes! This speed, combined with excellent pilot handling, means that all attending Le Bourget in June are in for a heart stopping aerobatic display including manoeuvres unique to the Eurofighter Typhoon, such as the High Velocity Vector roll.

In association with the Eurofighter Typhoon team, **AIRCRAFT ILLUSTRATED** is delighted to be able to offer one lucky reader the chance to win a VIP trip for two to the Paris airshow to experience the thrills of this unique aircraft first hand.

THE PRIZE
The prize includes return travel for two adults to Paris by Eurostar and overnight accommodation in a top quality hotel in the centre of Paris close to the beautiful Sacre Coeur.

In addition, winners will be provided with free entry tickets to the airshow for 20 June as well as being granted VIP access to the Eurofighter stand including the mock up cockpit, flight simulator film and a chance to meet one of the Eurofighter Typhoon test pilots.

A further two readers will receive a runners up prize of a limited edition Eurofighter Typhoon model.

HOW TO ENTER

To stand a chance of winning one of these fantastic prizes simply complete the following identification quiz and tie breaker telling us why the Eurofighter Typhoon team should choose you for this fabulous prize.

IDENTIFICATION QUIZ



TIE BREAKER

Eurofighter Typhoon should choose me to go to the Paris Airshow because..... (in 12 words or less)

More Eurofighter Typhoon recognition tests can be found on the Eurofighter Typhoon website at www.eurofighter-typhoon.com

Send your completed entry, on a postcard to: Marketing Dept, Eurofighter, Ian Allan Publishing Ltd, Riverdene Business Park, Molesey Road, Hersham, Surrey KT12 4RG.

Do not forget to include your name and address

All entries must be received by 21 May 1999.

RULES

1. This competition is open to all readers of AIRCRAFT ILLUSTRATED except for Ian Allan and Hulton-Deutsch Collection and their immediate families.
2. Only one entry per household is permitted.
3. The editor's decision is final.
4. The prize is as described and no cash alternative can be given.
5. Travel to and from the airport international will be the responsibility of the winners.
6. The prize does not include spending money or meals.

AIR EVENTS

Aircraft Illustrated presents the only **FULL** and regularly up-dated calendar of air events in Britain and around the world for 1999. Beware of cheap imitations! Listings compiled by Peter R. March

Another very full listing has been up-dated from the many faxes and e-mails received at the compiler's office (fax: UK (0) 117 968 3928 and e-mail prmarvia@aol.com) from display organisers around the world.

Readers are reminded once again that this listing is always subject to change in all respects — dates, venues and contact numbers. Each month the published calendar supersedes and replaces that published the previous month. You are advised to confirm directly with the organisers before making any travel arrangements. If we know a telephone number (or fax/web site) for an event we show it. The published listings are only as good as the information we receive. If you are involved in planning an airshow, fly-in or other air event in 1999, please send outline details to the compiler at PO Box 46, Westbury-on-Trym, Bristol BS9 1TF; or fax/e-mail as above.

UK AirEVENTS 1999

APRIL

- Gloucestershire/Staverton: Police/Medical Aviation Services Exhibition & Silson, Cambs: BPPA Precision Flying Competition (Tel: 01780 740973)
- Henstridge, Somerset: British Rotorcraft Association Fly-in (Tel: 01963 364231)
- Folly Dog Leg, Hungerford: BBML Inflation Days
- Compton Abbas, Dorset: Spring Fly-in (Tel: 01747 811767)
- Kemble, Gloucestershire: PFA Airman's Awareness Day (Tel: 01273 461616)
- Kemble, Glos: SBAC Challenge Cup Air Race (Tel: 0116 279 3913)
- North Weald, Essex: The Squadron PFA Young Eagles Fly-in (Tel: 01992 524510)
- Sherburn-in-Elmet, N Yorks: Grumman Owners Club Fly-in (Tel: 01977 861751)
- Shobdon, Hereford: Herefordshire Aero Club Spring Fly-in (Tel: 01588 708369)
- Coventry, Warwick: Air Atlantique Open Day (Tel: 01203 882629)
- East Fortune, East Lothian: NMS Museum of Flight Spillfire Day (Tel: 01620 880308 <http://www.nms.ac.uk>)
- Henstridge, Somerset: PFA Wessex Strut Fly-in (Tel: 01963 364231)
- Popham, Hampshire: Auster 25th Anniversary Fly-in (Tel: 01256 397733)
- Sleaf, Shropshire: Vintage Piper Aircraft Club Fly-in (Tel: 01353 663450)
- Swanton Morley, Norfolk: Open Day & Aerobatics Fly-in (Tel: 01362 638193 <http://www.blinternet.com/~SwantonMorley>)
- Jersey, Channel Islands: 45th International Air Rally (Tel: 01534 743390)
- 2 May
- Northrepps, Norfolk: Cromer Vintage (Warbirds) Weekend (Tel: 01263 513015 <http://www.chris.gurney.co.uk>)
- 15-23
- Weston-super-Mare, Somerset: Museums Week Special Events at The Helicopter Museum (Tel: 01934 635227)
- 16
- Compton Abbas, Dorset: Pooley's Air Day (Tel: 01747 811767)
- 16
- North Weald, Essex: North Weald Air Display '99 (Tel: 01992 524233 <http://www.deltaweb.co.uk/mtrp/dnw/ndaw.htm>)
- 16
- Pembrey, Carmarthen: Pembrey Fly-in (Tel: 01554 891534)
- 16
- Sywell, Northants: Pietenpol Gathering (Tel: 01604 644917)
- 20-22
- Swansea, W Glamorgan: BAA South Wales Open Competition & postponed 1998 National Aerobatic Championships (Tel: 01344 891721 <http://www.aerobatics.org.uk>)
- 21-23
- Bath Somerset: Balloon Festival
- 21-23
- North Weald, Essex: Aerofair 99 (Tel: 01992 522210 <http://www.aerofair.co.uk>)
- 22
- Netherthorpe, Notts: PFA Fly-In (Tel: 01623 29244)
- 22-29
- Bicester, Oxon: RAF Gliding & Soaring Association Golden Anniversary and International Vintage Glider Rally (Tel: 01869 252483)
- 22-30
- Tibbenham, Norfolk: BGA Eastern Regional Gliding Competition (Tel: 0118 253 1051)
- 23
- North Coates, Lincs: Vintage Air Day (Tel: 01472 388550)
- 24-04
- Hinton-in-the-Hedges, Oxon: 25th Anniversary Schleicher ASK-18 Motor Glider Rally (Tel: 01908 644962)
- 26-31
- Lee-on-Solent, Hants: Hovercraft Museum Trust Hovershow (Tel: 01705 601310)
- 28-31
- Long Marston, Warwickshire: Club Team Trophy Microflight Competition (Tel: 01952 882081)
- 28-31
- Mull, Scotland: Glenforsa Fly-In (Tel: 01680 300402/812487)
- 28-31
- Stoke-on-Trent: Trentham Gardens Balloon Festival (Tel: 01672 851185)
- 29
- White Waltham, Berks: TopNav 99 Navigation Competition (Tel: 0171 591 3130 <http://www.rin.org.uk>)
- 29-30
- Eggesford, Devon: PFA Devon Strut Fly-in (Tel: 01548 531923)
- 29-30
- Greenfield, Manchester: Saddleworth Arts Festival: Balloon Meet (Tel: 01562 650750)
- 29-30
- RAF Mildenhall, Suffolk: Air Fete 99 (Tel: 01638 543341)
- 29-30
- Swanton Morley, Norfolk: Wallis Days Autogyro & Light Helicopter Fly-in (Tel: 01974 821 205, http://ourworld.com/pulseave.com/homepages/rotor_gazette_in_langethro/Wallisdy.htm)
- 29-30
- Truro & Lands End, Cornwall: PFA Cornwall Strut Fly-ins (Tel: 01579 320487) <http://www.goodwood.co.uk>
- 29-31
- Weston-super-Mare, Somerset: The Helicopter Museum, Restoration and Engineering Weekend (Tel: 01934 635227)
- 30
- Coventry, Warwick: Air Atlantique Open Day (Tel: 01203 882629)
- 30
- Kilcock, Hereford: Heli Bull Helicopter Fly-in (Tel: 0181 570444 <http://www.parkin.co.uk/kilcock>)
- 30
- Kirkbride, Cumbria: Lorton Aero Club Social Fly-in (Tel: 01697 342142)
- 30-31
- Brighton, N Yorks: Spring Fly-in & Piper Cub Rally (Tel: 01757 289065)
- 30-31
- Enniskillen, NI: Grumman Owners Annual European Fly-in (Tel: 01861 527214)
- 30-31
- Southend-on-Sea Seaford, Essex: Southend Airshow (Tel: 01702 215166)
- 31
- Sherburn-in-Elmet, N Yorks: Veteran and Vintage Fly-in (Tel: 01977 682674)

MAY

- Brooklands, Surrey: PFA West London Strut Fly-in (Tel: 0181 979 7559)
- Henstridge, Somerset: FAA Officers Association Fly-in (Tel: 01963 364231)
- Kemble, Glos: Bristol Heritage Fly-in to mark the Official Opening of the Bristol Heritage Trust Museum (Tel: 01285 771144 <http://www.kemble.net>)
- 15-16
- Fishburn, Durham: Hot-Air Balloon Festival (Tel: 01207 526916)
- 15-16
- Henstridge, Somerset: First Annual Henstridge Airfield Cholesterol-Fly-in Breakfast (Tel: 01963 364231)
- 15-16
- Kemble, Glos: 3rd Great Vintage Flying Weekend (Tel: 01747 638165)
- 15-16
- Newark, Notts: Air Museum Tribute to the Canberra (Tel: 01636 707170)

- 15-16
- Northrepps, Norfolk: Cromer Vintage (Warbirds) Weekend (Tel: 01263 513015 <http://www.chris.gurney.co.uk>)
- 06
- Bournemouth, Dorset: Jet Heritage Flying Day (Tel: 01202 581676)
- 06
- Old Warden, Beds: Great British Picnic Flying Day (Tel: 01767 627288/0891 323310 <http://www.shuttleworth.org>)
- 09
- Old Warden, Beds: Shuttleworth Collection Schools Day (Tel: 01767 627288/0891 323310 <http://www.shuttleworth.org>)
- 09
- Swanton Morley, Norfolk: Arnold Scheme Reunion & Fly-in (Tel: 01702 472849 <http://www.blinternet.com/~SwantonMorley>)
- 10
- Barton, Gtr Manchester: Start of The Great Round Britain Microflight Rally 1999 (Tel: 01663 719030)
- 11-13
- Alderney, Channel Islands: Alderney Flying Club 15th Fly-in (Tel: 01481 822297)
- 11-13
- Nostell Priory, Yorks: Balloon Meet (Tel: 01484 713636)
- 11-13
- Parham Park, Sussex: Balloon Preservation Group Meet (Tel: 01903 763598)
- 11-19
- Draperstown, Co Derry, NI: Balloon Meet (Tel: 01648 27327)
- 12
- Shoreham, W Sussex: Rouen to Shoreham Fly-in (Tel: 01273 296900)
- 12
- Sleaf, Shropshire: British Aerobatic Association Gliding Barratt & Don Henry Trophy Competitions (Tel: 01344 891721 <http://www.aerobatics.org.uk>)
- 12
- Woodford, Cheshire: RAFA/BAA A'show (Tel: 0161 955 3016)
- 12-13
- Northrepps, Norfolk: Cromer Ladies Fly-in (Tel: 01263 513015 <http://www.chris.gurney.co.uk>)
- 12-20
- Bidford-on-Avon, Warks: BGA Regional Gliding Competition (Tel: 0116 253 1051)
- 13
- Brighton, N Yorks: Military Aircraft Fly-in (Tel: 01757 289065)
- 13
- Compton Abbas, Dorset: Early Summer Fly-in (Tel: 01747 811767)
- 13
- Little Snoring, Norfolk: McAuliffe Flying Group Wings and Wheels Day (Tel: 01328 862470/820417)
- 13
- Popham, Hants: Pre-1939 Fly-in (Tel: 01256 397733)
- 13
- North Coates, Lincs: Microflight Rally (Tel: 01472 388550)
- 13
- RAF Cosford, West Midlands: Cosford A'show & RAF At Home (Tel: 01902 372393)
- 13
- Weston-super-Mare, Somerset: The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- 18
- Barton, Lancs: Lancashire Aero Club Evening Flying Rally (Tel: 0161 7877326)
- 18
- Sleaf, Shropshire: Shropshire Aero Club Evening Fly-in/Barbecue (Tel: 01939 232882)
- 18-20
- Birkenhead, Merseyside: Balloons Across the Mersey Meet (Tel: 01672 564462)
- 18-20
- Goodwood, Sussex: Goodwood Festival of Speed (Tel: 01243 755000 <http://www.goodwood.co.uk>)
- 19
- Branscombe, Devon: PFA Devon Strut Fly-in (Tel: 01548 531923)
- 19
- Clophill, Beds: Clophill Fete Airshow
- 19
- Coventry, Warwick: Air Atlantique Open Day (Tel: 01203 882629)
- 19
- Newtownards, Belfast, NI: J1ster Air Show (Tel: 01232 422876)
- 19
- Old Warden, Beds: Second Flying Evening (Tel: 01767 627288/0891 323310 <http://www.shuttleworth.org>)
- 19
- RAF Church Fenton, N Yorks: 2434 Squadron Air Cadets Open Day (Tel: 01977 684858)
- 19
- RAF Lyneham, Wilts: Classics on the Wing (eve)
- 19-20
- Swansea, Wales: RAAc Handicap Air Racing championship Entrées Trophy Race (Tel: 0116 279 3913)
- 19-20
- Swinford, Rugby: BBAC Comps Club Grand Prix
- 19-27
- Aston Down, Glos: BGA Cotswold Regional Gliding Competition (Tel: 0116 253 1051)
- 20
- Fenland, Lincs: Vintage Piper Aircraft Club Fly-in (Tel: 01353 663450)
- 20
- Henstridge, Somerset: PFA Wessex Strut Midsummer Fly-in (Tel: 01963 364231)
- 20
- Popham, Hampshire: PFA West London Strut Fly-in (Tel: 01256 397733)
- 20
- Priory Farm Airstrip, Tibenham, Norfolk: PFA Breckland Strut Fathers Day Fly-in & Bar-BQ (Tel: 01379 677334)
- 20
- St Angelo, Enniskillen, NI: Enniskillen Airshow 1999 (Tel: 01849 420538) <http://www.aerobatics.org.uk>
- 20
- Swanton Morley, Norfolk: Biplane & Vintage Fly-in (Tel: 01362 638193 <http://www.blinternet.com/~SwantonMorley>)

JUNE

- 04-06
- Bidford-on-Avon, Warks: FAA Officers Association Fly-in Weekend (Tel: 01769 763347)
- 04-06
- Leyland, Lancs: Balloon Festival (Tel: 01772 600103)
- 05
- Bolton, Lancs: BAA Lostock Families Day #
- 05
- Finners, Bucks: Vintage Aircraft Club 22nd Vehicle Day & Fly-in (Tel: 01296 714900)
- 05
- Headcorn, Kent: Aeronca Fly-in/Fly-Out to France (Tel: 01752 406660)
- 05
- Old Buckenham, Norfolk: BPPA Precision Training Camp (Tel: 01728 668354 <http://www.aerobatics.org.uk>)
- 05-06
- Domoch, Highland: Highland Aero Club Fly-in & Barbecue (Tel: 01479 810733)

- 20 **Tatenhill, West Midlands:** Reg's Final Fly-in/West Midlands PFA (Tel: 01889 271037)
- 25-27 **Henstridge, Somerset:** BPPA National Precision Flying Championships (Tel: 01256 780136)
- 26 **Brough, E. Yorks:** BAE Brough Families Day 8
- 26 **Sleaf, Shropshire:** Goding Barratt & Don Henry Aerobatic Trophies (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- 26-27 **Baginton, Coventry, Warks:** Air Britain Fly-in 1999 (Tel: 01543 684275, <http://www.netproclara.net/flyin/index.html>)
- 26-27 **Biggin Hill, Kent:** 37th International Air Fair (Tel: 01959 572277, <http://www.aerospaysint.co.uk>)
- 26-27 **Henstridge, Somerset:** BPPA National Championship Round (Tel: 01963 364231)
- 26-27 **North Weald, Essex:** The Squadron Cubathon Fly-in (Tel: 01992 524510)
- 26-27 **Old Warden, Beds:** DH Moth Club Charity Flying Days (Tel: 01767 627288, <http://www.shuttleworth.org>)
- 26-27 **RAF Waddington, Lincs:** RAF Waddington At Home Days (Tel: 01522 726100, <http://www.servers.qinetiq.co.uk/waddington>)
- 27 **Popham, Hants:** PFA West London Strut Fly-in (Tel: 0181 979 7559)
- 27 **Rochester, Kent:** PFA Mid Kent Strut 5th Annual Pancake Fly-in (Tel: 0181 462 4401)

JULY

- 02-04 **Cranfield Beds:** PFA International Air Rally (Tel: 01273 461616, <http://www.pia.org.uk/rally.htm>)
- 02-04 **Southampton, Hants:** Southampton Balloon & Flower Festival (Tel: 01672 564462)
- 03-04 **Bembridge, Isle of Wight:** RAE/C Air Racing Weekend/Aerobics and Schneider Trophy Air Races (Tel: 0116 279 3913)
- 03-04 **Yatton, Somerset:** Woodspring Wings '99 (Tel: 01275 343641)
- 03-11 **Dunsstable Downs, Beds:** BGA 15-metre Class National Gliding Championships (Tel: 0116 253 1051)
- 04 **Eimdon, Birmingham:** Birmingham International Airport Open Day
- 04 **Fenland, Lincs:** Strawberry Fly-in (Tel: 01406 540330)
- 04 **North Coates, Lincs:** American Independence Day Rally (Tel: 01472 368850)
- 04 **Old Warden, Beds:** Summer Air Display & Arnold Scheme Reunion Seafarer Fly-in (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 10 **Andrewsfield, Essex:** BPPA Precision Flying Competition (Tel: 01787 375766)
- 10 **Beverley, East Yorks:** Hull Aero Club Annual Fly-in (Tel: 01964 544994)
- 10 **Fenland, Lincs:** Fenland McAulay & Newbold Aerobatic Trophy Competitions (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- 10 **Old Buckenham, Norfolk:** Pulsar Squadron Fly-in (Tel: 01628 632406)
- 10-11 **Duxford, Cambs:** The Fighter Collection Flying Legends Air Show (Tel: 01223 835000, <http://www.wm.org.uk/special14.htm#dates>)
- 10-11 **Eggesford, Devon:** PFA Devon Strut Fly-in (Tel: 01548 531923)
- 10-11 **Northrepps, Norfolk:** Cromer Basille (French Aircraft) Fly-in (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 11 **North Weald, Essex:** Wings & Wheels Model Spectacular (Tel: 01664 562038)
- 10-11 **Penshurst Place, Tonbridge, Kent:** Hot Air Balloon Meet
- 11 **Compton Abbas, Dorset:** Wings and Wheels Grand Prix Fly-in (Tel: 01747 811767)
- 11 **Popham, Hants:** DH & Stampe Fly-in (Tel: 01256 397733)
- 11 **Weston-super-Mare, Somerset:** The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- 11-12 **Wirral, Merseyside:** Wirral Show 1999 (Tel: 0151 207788)
- 16 **Sleaf, Shropshire:** Shropshire Aero Club Evening Fly-in/Barbecue (Tel: 01939 232882)
- 16-18 **Bromyard, Herefordshire:** BBAC Comps Club Grand Prix
- 16-18 **Storthes Hall, W. Yorks:** Huddersfield Balloon Meet (Tel: 01484 713636)
- 16-18 **Weston Park Balloon Festival:** (Tel: 01672 851855)

- 17 **Old Warden, Beds:** Third Flying Evening (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 17 **RNAS Yeovilton, Somerset:** International Air Day (Tel: 01935 456751)
- 17 **White Waltham, Berks:** Festival of the Air Aerobics (Tel: 01628 823273)
- 17-18 **Ashcroft/Bryan's Landings, nr. Crewes, Cheshire:** Two-day Ashkosh Charity Fly-in (Tel: 01270 528378)
- 17-18 **East Fortune, East Lothian:** NMS Museum of Flight Festival of Flight Air Show (Tel: 01627 480308, <http://www.nms.ac.uk>)
- 17-18 **Northrepps, Norfolk:** Cromer Seafood Weekend (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 17-25 **Booker, Bucks:** BGA 18 metre Class National Gliding Championships (Tel: 0116 253 1051)
- 17-25 **Nympsfield, Glos:** BGA Club Class National Gliding Championships (Tel: 0116 253 1051)
- 18 **Compton Abbas, Dorset:** Mid-Summer Fancy Dress Fly-in (Tel: 01747 811767)
- 18 **Fairoaks, Surrey:** London Transport Mind the Gap Fly-in (Tel: 01790 721990)
- 18 **Redhill, Surrey:** Vintage Aircraft Fly-in and Aeronautical Collector's Fair (Tel: 01737 822212)
- 21 **RNAS Culdrose, Cornwall:** International Air Day (Tel: 01326 574171)
- 22 **Bournemouth, Dorset:** Balloon Glow in Lower Gardens (Tel: 01460 234550)
- 23 **Bournemouth, Dorset:** Balloon Launch (Tel: 01460 234550)
- 23 **RAF Fairford, Gloucestershire:** RIAT 1999 Enthusiasts Day - Ticket applications by phone only (Tel: 01285 713458)
- 23-25 **Longleat, Wilts:** Longleat Balloon Festival (Tel: 01672 851185)
- 24-25 **Belle Vue, N. Devon:** Aerobics Fly-in (Tel: 01752 40560)
- 24-25 **Brighton N Yorks:** 10th Anniversary Old Timer Air Show (Tel: 01752 284065)
- 24-25 **Henstridge, Somerset:** Rhine Birds & Flying Weekend (Tel: 01361 364231)
- 24-25 **RAF Fairford, Glos:** The Royal International A. Tattoo 1999 (Tel: 01285 713300, <http://www.rafb.co.uk/rat99/index.html>)
- 24-25 **Welshpool, Powys:** RAE/C Air Racing Weekend (Tel: 0116 279 3913)
- 29-30 **Lowestoft, Suffolk:** Lowestoft Seafloat Air Festival (Tel: 01502 565881)
- 29-31 **Sywell, Northants:** BAA National Aerobatic Championships (Senior) (Tel: 01344 891721, <http://www.teehaters.org.uk>)
- 30-01 Aug **Eastnor Castle, Leicestershire:** Hereford West Midlands Balloon Meet (Tel: 01907 644533)
- 30-01 Aug **Silverstone, Northants:** 40 Balloons at Silverstone
- 30-01 Aug **Weston-super-Mare, Somerset:** Weston Super Mare (Tel: 01934 635227)
- 30-03 Aug **Duxford, Cambs:** International Conventions Society Annual Convention (Tel: 0116 253 1051)
- 31 **Barton, Lancashire:** Lancashire Aero Club Hot Air Dance (Tel: 0161 787 7326)
- 31 **Middle Waltham, Hants:** Music in the Air (Tel: 01980 674121)
- 31 **North Weald, Essex:** The Squadron Biker Festival (Tel: 01992 524510)
- 31 **RAF Linton-on-Ouse, N Yorks:** 50th Anniversary Photocall & Pre-booked
- 31-01 Aug **Bickling Hill, Norfolk:** Balloon Meet (Tel: 01362 69824)
- 31-01 Aug **Kemble, Gloucestershire:** VAC 4th Vintage & Classic Anglo-Irish Fly-in (Tel: 02385 771144, <http://www.kemble.net>)
- 31-08 **Husbands Bosworth, Leics:** BGA Standard Class National Gliding Championships (Tel: 0116 253 1051)
- 31-08 **Sutton Bank, N Yorks:** BGA Regional Gliding Competition (Tel: 0116 253 1051)

AUGUST

- 01 **Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)
- 01 **Old Warden, Beds:** Shuttleworth Military Pageant (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 01-08 **Northrepps, Norfolk:** Cromer Summer Micro Week (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 05 **Ashton Court, Bristol:** Bristol International Balloon Fiesta Night Glow (Tel: 0117 953 5884, <http://www.bristol-fiesta.co.uk>)

- 06-08 **Ashton Court, Bristol:** Bristol International Balloon Fiesta (Tel: 0117 953 5884, <http://www.bristol-fiesta.co.uk>)
- 07-08 **Egginton, Derby:** Derby Airfield Anniversary Fly-in (Tel: 01283 733803)
- 07-08 **Sunderland, Tyne & Wear:** Sunderland Autumn Fly-in (Tel: 0191 5109317)
- 08 **Bournemouth, Dorset:** Jet Heritage Flying Day (Tel: 01202 581676)
- 08 **Fishburn, Durham:** Vintage & Classic Cars Rally and Fly-in (Tel: 01207 520916)
- 08 **Popham, Hants:** Vintage Piper Aircraft Meeting (Tel: 01256 397733)
- 08 **Rochester, Kent:** PFA Mid-Kent Strut Aerial Treasure Hunt (Tel: 0181 462 4401)
- 08 **Swanton Morley, Norfolk:** Swanton Morley Airshow 99 (Tel: 01362 638193, <http://www.bltnet.com/~SwantonMorley>)
- 08-11 **Guernsey & Alderney, CI:** Eclipse of the Sun 1999 Fly-in (Tel: 01481 37766)
- 10 **RAF St Mawgan, Cornwall:** The Lambert & Butler Light Experience Fly-in
- 10-11 **Bodmin, Cornwall:** Total Solar Eclipse Fly-in (<http://www.cornwallclubdemon.com/~eclipse.htm>)
- 11 **Henstridge, Somerset:** Total Eclipse of the Sun Fly-in (Tel: 01963 364231)
- 11 **Plymouth, Devon:** Eclipse Air Display
- 11 **St Minver, Cornwall:** Roseway Golf & Country Club Total Eclipse Fly-in (Tel: 01208 863000-863667, <http://www.roseway.co.uk>)
- 11 **RAF St Mawgan, Cornwall:** The Lambert & Butler Light Experience & International Air Day
- 13 **Sleaf, Shropshire:** Shropshire Aero Club Evening Fly-in/Barbecue (Tel: 01939 232882)
- 13-15 **Basinstoke, Hants:** Balloons over Basinstoke (Tel: 01672 564462)
- 13-15 **Perth, Scotland:** The Fair City Rally & Classic Car Rally (Tel: 01738 553357)
- 14 **Compton Abbas, Dorset:** Tiger Trophy Aerobatic Competition (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- 14 **East Fortune, East Lothian:** NMS Museum of Flight and PFA Strut Fly-in (Tel: 0131 441 6984, <http://www.nms.ac.uk>)
- 14 **Teversham, Cambridgeshire:** BPPA Precision Flying Competition (Tel: 01525 717015)
- 14-15 **Brighton, N Yorks:** Jolly Jodeliers Fly-in (Tel: 01757 289065)
- 14-15 **Kemble, Glos:** Aerobics/Luscombe/Piper Classic Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 14-15 **Shobdon, Hereford:** RAE/C Air Racing Weekend/Grosvenor Trophy Air Race (Tel: 0116 279 3913)
- 14-20 **Northrepps, Norfolk:** Cromer Carnival Week (Tel: 01263 513015)
- 14-22 **Leaham, Hants:** Open Class National Gliding Championships & BGA Regional Gliding Competition (Tel: 0116 253 1051)
- 15 **Coventry, Warks:** Air Atlantique's Filles Festival of Flying (Tel: 01203 307566)
- 15 **Old Warden, Beds:** Vintage Transport Day (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 15 **Weston-super-Mare, Somerset:** The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- 19-22 **Eastbourne, East Sussex:** Airbourne 99 (Tel: 01323 415434)
- 20-22 **Northampton Race Course, Northants:** Northampton Balloon Fiesta (Tel: 01604 236791)
- 21 **Bagby, N Yorks:** Chipmunk Club Fly-in
- 21 **Chepstow Race Course, Gwent:** Air Day Wales (Tel: 01267 231812)
- 21 **Hucknall, Notts:** Hucknall Airfield Fly-in (Tel: 0115 9642269)
- 21 **Old Warden, Beds:** The Shuttleworth Collection Flying Proms 1999 (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 21-22 **Farway Common, Devon:** PFA Devon Strut Fly-in (Tel: 01548 531923)
- 21-22 **Woburn Abbey, Beds:** 20th Annual International DH Moth Rally (Tel: 01442 862077)
- 21-29 **Bedford-on-Avon, Warks:** BGA Junior Class Gliding Championships (Tel: 0116 253 1051)
- 21-29 **Dunstable, Bedfordshire:** BGA Regional Gliding Competition (Tel: 0116 253 1051)
- 21-29 **Gransden Lodge, Cambs:** BGA Regional Gliding Competition (Tel: 0116 253 1051)
- 21-30 **Enstone, Oxon:** BGA Enstone Regional Gliding Competition (Tel: 0116 253 1051)

- 22 **Caernarfon, N Wales:** Air Caernarfon's Air Day Wales (Tel: 01203 307566)
- 22 **Compton Abbas, Dorset:** De Havilland Fly-in (Tel: 01747 811767)
- 22 **Rougham, Suffolk:** Rougham Air Display 99 (Tel: 01359 211421)
- 26-27 **Clacton-on-Sea, Essex:** Clacton Air Show (Tel: 01205 253220)
- 27-29 **Dunkeld, Perthshire:** Balloon Weekend (Tel: 01968 6744 5)
- 27-30 **Lowther Park, Cumbria:** Balloon Meet
- 27-30 **Tavistock, Devon:** Hot-air Balloon Meet (Tel: 01404 823102)
- 27-30 **Enfield, N London:** Treni Country Park Balloon Meet (Tel: 01672 851185)
- 28 **Kemble, Glos:** Kemble Open Day & OGRI Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 28 **Bembridge, Isle of Wight:** PFA Isle of Wight Strut Fly-in (Tel: 01983 874204)
- 28-29 **Egginton, Derby:** Boogie Pup Club Rally (Tel: 01281 33803)
- 28-29 **Newark, Notts:** Air Museum's 50th Anniversary of Shackleton Celebration (Tel: 01243 707170)
- 28-29 **Northrepps, Norfolk:** Cromer Open Weekend and Russian Fly-in (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 28-29 **Plockton and Broadford (Isle of Skye), Scotland:** Highland Aero Club Fly-in & Barbecue (Tel: 01479 610733)
- 28-30 **Aviemore, Highlands:** Scottish Balloon Festival (Tel: 01672 564462)
- 28-30 **Elvington, N Yorks:** Elvington Air Spectacular (Tel: 01423 867144)
- 28-30 **Nuthampstead, Herts:** 936 Squadron ATC Annual Fly-in (Tel: 01920 464585)
- 28-30 **Old Warden, Beds:** Bedfordshire Millennium Festival (Tel: 01767 627288, <http://www.shuttleworth.org>)
- 29 **North Weald, Essex:** The Squadron Air Amusement Charity Fly-in & Fun Day (Tel: 01992 524510)
- 29-30 **Brighton, N Yorks:** August Bank Holiday Fly-in (Tel: 01757 289065)
- 29-30 **Weston-super-Mare, Somerset:** The Helicopter Museum, Restoration and Engineering Weekend (Tel: 01934 635227)

SEPTEMBER

- 03-04 **Conington, Cambs:** BAA National Aerobatic Championships (Junior) (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- 04 **Folkestone Seafloat, Kent:** Shepway Wings & Wheels (Tel: 01303 852303)
- 04 **Hadleigh, Suffolk:** Raydon Wings Air Show (Tel: 01473 827544, <http://www.raydonwings.com>)
- 04 **Shobdon, Hereford:** FAA Officers Association Fly-in (Tel: 01935 812470)
- 04 **Southport Seafloat, Lancs:** Southport Airshow (Tel: 01519 342118)
- 04-05 **Belle Vue, Devon:** PFA Devon Strut Fly-in (Tel: 01548 531923)
- 04-05 **Leicester, Leicestershire:** RAE/C Air Racing Weekend/Stewards and Kings Cup Races (Tel: 0116 279 3913)
- 04-05 **Kemble, Glos:** Kemble Challenge Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 04-05 **Shoreham, West Sussex:** RAF A Battle of Britain Airshow 99 (Tel: 01273 441545)
- 04-06 **Llangollen, N Wales:** N W Balloon Festival (Tel: 01672 851185)
- 05 **Folkestone Seafloat, Kent:** Shepway Festival Airshow (Tel: 01303 852303)
- 05 **Little Gransden, Cambs:** Children in Need Charity Fly-in (Tel: 01480 459149)
- 05 **Old Sarum, Wilts:** PFA Solent Strut Fly-in (Tel: 01722 322525)
- 05 **Old Warden, Beds:** Shuttleworth Pageant (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 09-12 **Salisbury, Wiltshire:** BAA National Glider Aerobatic Championships (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- 10-12 **Guernsey, CI:** 28th Guernsey Aero International Air Rally (Tel: 01481 616267, <http://www.clonine.com/aeroclub>)
- 11 **RAF Leuchars, Fife:** RAF Battle of Britain at Home Day (Tel: 01334 839000, <http://www.airshow.co.uk>)
- 11-12 **Newark, Notts:** Newark Balloon Festival (Tel: 01484 713636)
- 11-12 **Shobdon, Hereford:** Herefordshire Aero Club Autumn Fly-in (Tel: 01568 708369)

OCTOBER

- 04-10 **Finmere, Bucks:** Vintage Aircraft Club Autumn Fly-in (Tel: 01296 714900)
- 04 **Old Warden, Beds:** Autumn Air Day (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 04 **Popham, Hampshire:** Wings, Wheels Auto-Aerobatics & End of Season Fly-in (Tel: 01256 397733)
- 04 **Sibson, Cambs:** BPPA Precision Flying Competition (Tel: 01733 380136)
- 04-10 **Kemble, Glos:** End of Season Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 04 **Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)
- 04 **Popham, Hants:** Wings, Wheels Auto-Aerobatics & End of Season Fly-in (Tel: 01256 397733)
- 04 **Weston-super-Mare, Somerset:** The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- 04 **Northrepps, Norfolk:** Cromer End of Season Fly-in (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 04 **Duxford, Cambs:** WMA Autumn Air Show (Tel: 01223 835000, <http://www.wm.org.uk/special14.htm#dates>)
- 04 **Swanton Morley, Norfolk:** Arnold Scheme Reunion & Fly-in (Tel: 01702 472849, <http://www.bltnet.com/~SwantonMorley>)
- 04 **Brighton, N Yorks:** Pre-Hibernation Fly-in (Tel: 01757 289065)

- Duxford, Cambs:** Duxford '99 Air Show (Tel: 01223 835000, <http://www.wm.org.uk/special14.htm#dates>)
- Fishburn, Durham:** Morgan Sports Car Day & Fly-in (Tel: 01207 520916)
- Londonderry, NI:** Northern Ireland International Air Display CANCELLED
- Popham, Hants:** Wings, Wheels, Auto-Aerobatics & Auster Fly-in (Tel: 01256 397733)
- Watchford Farm, Somerset:** PFA Devon Strut Fly-in (Tel: 01548 531923)
- Weston-super-Mare, Somerset:** The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- Guernsey, CI:** Battle of Britain Static Display (Tel: 01481 721558)
- Swanton Morley, Norfolk:** Arnold Scheme Fly-in (Tel: 01702 472849, <http://www.bltnet.com/~SwantonMorley>)
- Kemble, Glos:** Kemble PFA Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- St Helier Sea Front, Jersey, CI:** Jersey International Air Display (Tel: 01534 873956)
- Goodwood, Sussex:** Goodwood Motor Circuit Historic Meeting (& flying displays) (Tel: 01243 755000, <http://www.goodwood.co.uk>)
- Popham, Hants:** Pietenpol Picnic (Tel: 0118 9663955)
- Old Warden, Beds:** Aerobics Fly-in (Tel: 01752 405660)
- Dunsfold, Surrey:** British Aerobics Charity Fly-in (Tel: 01483 265396)
- Fishburn, Durham:** Model Flying Day (Tel: 01207 520916)
- Henstridge, Somerset:** PFA Wessex Strut Fly-in (Tel: 01963 364231)
- Popham, Hants:** Solent Aviation Society & Luscombe Fly-in (Tel: 01256 397733)
- Old Warden, Beds:** Vintage Piper Aircraft Club Fly-in (Tel: 01353 663450)
- Sherburn-in-Elmet, Yorks:** The Late Bash Aerobatic Competition (Tel: 01344 891721, <http://www.aerobatics.org.uk>)
- Shoreham Airport, Sussex:** Aeromart/Aerobatics (Tel: 01424 440644)
- Northrepps, Norfolk:** Cromer Alter Harvest Farmers' Weekend (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- Alderney, Channel Islands:** 3rd Alderney Island Air Races (Tel: 01481 822297)
- North Weald, Essex:** Flypast Photo Day (Tel: 01992 524510)
- Bournemouth, Dorset:** Jet Heritage Flying Day (Tel: 01202 581676)
- Compton Abbas, Dorset:** End of Summer Fly-in (Tel: 01747 811767)
- Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)
- North Weald, Essex:** The Squadron Fly-in (Tel: 01992 524510)
- Redhill, Surrey:** Helitech 99 (Tel: 0181 949 8222, <http://www.spearhead.co.uk/spearhead/exhibitions/main/helitech99/default.htm>)
- 04-10 **Finmere, Bucks:** Vintage Aircraft Club Autumn Fly-in (Tel: 01296 714900)
- 04 **Old Warden, Beds:** Autumn Air Day (Tel: 01767 627288-0891 323310, <http://www.shuttleworth.org>)
- 04 **Popham, Hampshire:** Wings, Wheels Auto-Aerobatics & End of Season Fly-in (Tel: 01256 397733)
- 04 **Sibson, Cambs:** BPPA Precision Flying Competition (Tel: 01733 380136)
- 04-10 **Kemble, Glos:** End of Season Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 04 **Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)
- 04 **Popham, Hants:** Wings, Wheels Auto-Aerobatics & End of Season Fly-in (Tel: 01256 397733)
- 04 **Weston-super-Mare, Somerset:** The Helicopter Museum Open Cockpit Day (Tel: 01934 635227)
- 04 **Northrepps, Norfolk:** Cromer End of Season Fly-in (Tel: 01263 513015, <http://www.chris.gurney.co.uk>)
- 04 **Duxford, Cambs:** WMA Autumn Air Show (Tel: 01223 835000, <http://www.wm.org.uk/special14.htm#dates>)
- 04 **Swanton Morley, Norfolk:** Arnold Scheme Reunion & Fly-in (Tel: 01702 472849, <http://www.bltnet.com/~SwantonMorley>)
- 04 **Brighton, N Yorks:** Pre-Hibernation Fly-in (Tel: 01757 289065)

NOVEMBER

- 06 **Kemble, Glos:** Guy Fawkes Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 07 **North Weald, Essex:** The Squadron Christmas Fly-in (Tel: 01992 524510)
- 11 **Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)
- 14 **East Fortune, East Lothian:** Museum of Flight Open Cockpits Day (Tel: 01620 880308)
- 05 **North Weald, Essex:** The Squadron Christmas Fly-in (Tel: 01992 524510)
- 05 **Swanton Morley, Norfolk:** Arnold Scheme Fly-in (Tel: 01702 472849, <http://www.bltnet.com/~SwantonMorley>)
- 18 **Kemble, Glos:** Kemble PFA Fly-in (Tel: 01285 771144, <http://www.kemble.net>)
- 19 **Coventry, Warwicks:** Air Atlantique Open Day (Tel: 01203 882629)

* Provisional only, subject to confirmation.

Restricted private entry, public entry likely to be admitted

INTERNATIONAL AirEVENTS 1999

APRIL

- 17 **Ohio River, Downtown Louisville KY:** The Louisville Air Show (Tel: 502 228 6080)
- 17-18 **Anniston, AL:** Alabama International Airshow (Tel: 205 435 5887)
- 17-18 **Austin, TX:** Aerofest 99 Airshow (Tel: 512 343 7530, <http://www.chris.gurney.co.uk>)
- 17-18 **Geraldton, Western Australia:** Fly-in & Seafood Spectacular (Tel: Australia 89223 3434)
- 17-18 **Millington, TN:** Mid-South Airshow 1999 (Tel: USA 407 846 8808)
- 17-18 **NAS Norfolk, VA:** NAS Norfolk Air Show (Tel: USA 757 445 4774)
- 17-18 **Rock Hill, SC:** Rock Hill York County Airshow '99
- 18 **Latrobe Valley, Victoria, Australia:** Wings and Wheels Expo (Tel: Australia 351 423 806)
- 21-25 **Friedrichshafen, Germany:** AERO 99 (Tel: Germany 7541 7080, <http://www.messe-fr.de>)
- 21-25 **Moron Buenos Aires, Argentina:** 2nd Aviation Show (Tel: Argentina 1328 61 81, <http://www.aer99.com>)
- 22-24 **Casa Grande, AZ:** 4th Annual Southwest Steamers Fly-in (Tel: USA 800 572 4178)
- 23-26 **Margate, South Africa:** South African Homebuilders Fly-in (Tel: South Africa 3931 79189)

North Weald 99



Gates open at 8am.

 HSBC Gibbs	 BREITLING	 PCA	 TOTAL
 HANCOCK FORD	 Breeze	 Mitsubishi	

Admission
 Adult +1 Child £10 Advance £12 Gate
 Child (under 14) £8 Advance £10 Gate
 OAP's £8 Advance £10 Gate
 Children under 5 FREE
 Advance Tickets and Information Line
01992 524556 / 523011

16	McConnel AFB, Wichita, KS: Open House Airshow	23-27	Lock Haven, PA: 14th Annual Sentimental Journey to Cub Haven Fly-in (Tel: USA 717 893 4200)	16-18	Spokane, WA: Spokane Felts Field Northwest International Biplane Fly-In
17	Manikato, MN: Airst '99 Airshow (Tel: USA 507 388 5109)	24-27	Greenville, MS: Mississippi International Balloon Classic & Airshow (Tel: USA 601 455 7800)	17	Kelowna, BC: Air Display
18	Oklahoma City, OK: Aerospace America International Airshow (Tel: USA 405 685 9546)	25-26	Seppe, Netherlands: Oldtimer Fly-in (Tel: Netherlands 165 545842)	17-18	Bloomington, IL: The Prairie Air Show (Tel: USA 309 663 7632)
19	Reading, PA: 9th Annual World War II Commemorative Weekend Airshow (Tel: USA 610 372 7333)	25-27	Portland, OR: Rose Festival Airshow (Tel: USA 503 232 3000. Web: http://www.rosefestival.org)	17-18	Davenport, IA: Quad City Air Show (Tel: USA 319 285 7469)
20	Redding, CA: Redding Air Show '99	25-27	Speyer, Germany: OUV German Home-bull Fly-in (Tel: Germany 7158 65441)	17-18	Idaho Falls, ID: Airshow Idaho 1999
21	Winnipeg, MB: Winnipeg International Air Show (Tel: Canada 204 254 5314)	26	McChord AFB, WA: Air Show (Tel: USA 206 984 5631)	17-18	Lazo, BC: Comox Valley International Air Show (Tel: Canada 250 338 8217)
22	Cuatro Vientos, Madrid, Spain: Fundación Infante de Orleans Flying Day (Tel: Spain 1508 0233)	26	Marysville, CA: Yuba-Sutter Expo Airshow (Tel: USA 530 741 6463. http://www.auxexpo.com)	17-18	NAS Whidbey Island, WA: Whidbey Sea'n Sky Fest (Tel: USA 360 257 3966)
23	Grand Cayman: Cayman Is Int'l Aviation Weekend (Tel: USA 305 266 2300)	26	Nashville, TN: Challenge Air for Kids Fly-in	17-18	Raron, Switzerland: Flightsdays '99 (Tel: Switzerland 27923 1778)
24	Stauning, Denmark: K2 Club Fly-in (Tel: Denmark 9736 9044)	26-27	CFB Borden, ON: Base Borden Armed Forces Day & Airshow (Tel: Canada 705 423 2685)	17-18	Rothenburg, Germany: Flying Legends Flugplatzfest (Tel: Germany 3714 31980. http://www.flyinglegends.de)
25	Essen, Germany: Start of Euro Rally 1999 (Tel: Germany 21143 1651)	26-27	Detroit, MI: Air Michigan, Wayne County Air Show (Tel: USA 313 482 8888)	17-18	Tumwater, WA: South Puget Sound Air Show (Tel: USA 360 754 0793)
26	Rouen, France: Rouen to Brighlon (Shoreham) Departure (Tel: 01273 296900)	26-27	Fribourg-Ecuvillens, Switzerland: L'Aerobique 99 Oldtimers Fly-in (Tel: Switzerland 26 3231625)	17-18	Van Nuys, CA: Van Nuys Airport Aviation Expo-99 (Tel: USA 818 785 8838. http://www.tawa.org)
27	Sunnyvale, CA: Moffett Air Expo '99 Airshow	26-27	Greenville, MS: Mississippi International Balloon Classic & Airshow	17-19	Longview, TX: Great Texas Balloon Race (Tel: USA 903 237 5141)
28	Wageningen, Germany: Montgolfiade Brandenburg	26-27	Hillsboro, OR: US West Rose Festival Airshow (Tel: USA 503 684 1316)	20-21	Fort St John, BC: Fort St John Airshow '99 (Tel: Canada 250 785 8180)
29	Reglin, QLD, Australia: Old Station Warbird & Homebuilt Fly-in (Tel: Australia 749 346 562)	26-27	Le Luc, France: Open Days	23-25	Elyria, OH: Aircraft Past & Present Show (Tel: USA 440 323 4063. http://www.loraincounty.com/airport)
30	Corfu, Greece: Start of 6th Aeronautical Meeting of the Greek Islands (Tel: France 49381 2829)	26-27	Miramichi, New Brunswick, Canada: New Brunswick International Airshow	23-25	Newton, IA: Newton Air Show (Tel: USA 515 792 4000)
31	Hill AFB, UT: USAF Open House/Air Show (Tel: USA 801 777 3522)	26-27	Petersburg, VA: Virginia State EAA Fly-in	24	Parowan, UT: Parowan Southern Utah Airshow (Tel: USA 435 477 3803. http://www.pdqn.net)
32	Kilrush, Eire: Irish Open Aerobatic Competition	26-27	Racine, WI: Racine Lakefront Airshow '99	24	Wittmundhafen, Germany: Open Day
33	Lajes, Azores: Community Appreciation Day '99 Airshow	26-27	Valle-Williams, Grand Canyon, AZ: Second Annual High Country Warbirds Air Display (Tel: USA 520 635 1000)	24-25	CFB Cold Lake, AB: 4 Wing Open House & Display http://www.4wing.coldlake.dnd.ca/airshow/index.htm
34	Paso Robles, CA: 26th Annual Paso Robles Airshow (Tel: USA 805 238 9266)	26-27	Westhampton Beach, NY: Wings over Long Island Air Show	24-25	Dayton, OH: US Air & Trade Show (Tel: USA 216 781 0208. http://www.usats.org)
35	Boise, ID: Idaho Aerofair Airshow (Tel: USA 208 368 0661)	26-27	Willow Run, MI: Wayne County Air Show (Tel: USA 216 781 0208)	24-25	Eeklo, Belgium: Hot-air Balloon Meet
36	Brampton, ON: Fly'n Fun (Tel: USA 905 638 1400. http://www.bramfly.com)	26-27	Worland, NY: Military Appreciation Weekend Airshow	24-25	Kalamazoo, MI: Warbirds over Kalamazoo Airshow
37	CFB Trenton, ON: Quinte International Air Show (Tel: Canada 613 965 2219. http://www.5wing.trenton.dnd.ca/quinte99/index.html)	26-30	Luga, Malta: Malta International Air Rally (Tel: Malta 242860. http://www.geocities.com/maltairally)		
38	Cincinnati, OH: Blue Ash Airport Days (Tel: USA 513 488 2022)	27	Travis AFB, Fairfield, CA: Air Expo '99 Airshow (Tel: USA 707 424 0194. http://travis.af.mil)		
39	NAS Lemoore, Hanford, CA: US Navy Open House & Airshow (Tel: USA 209 998 3327. http://www.lemore.navy.mil)	27	Grosseto AB, Italy: Open Day		
40	North Kingston: Rhode Island National Guard Open House & Airshow (Tel: USA 401 886 1423)	27	St Dizier AB, France: French AF Porte Ouverte BA113		
41	Cannon AFB, NM: JSAF Open House	27	Seppe, Netherlands: Vliegenveld Museum Opening & Airshow (Tel: Netherlands 165 545842)		
42	Falaise, France: Aero Club de Falaise Fly-in (Tel: France 2 3190 0654)	29	Malaga, Spain: Start of Morocco Air Rally (Tel: France 1 4875 5017)		
43	Karup, Denmark: Danish Air Force Open Day (http://www.fsnkar.dk/uk/start.htm)				
44	Manitowoc, WI: Manitowoc County Airport Day (Tel: USA 920 682 0909)				
45	Istres AB, France: French National Air Show				
46	Le Bourget, Paris, France: 43rd Paris Air Show (Tel: France 1 5323 3333. http://www.pars.air_show.com)				
47	Centralia, ON: Grand Bond International Air Show (Tel: USA 519 238 2945)				
48	McConnell AFB, KS: McConnell Air Show (Tel: USA 316 652 3141)				
49	Prague, Czech Rep: Balloonmania Praha				
50	Mountain View, CA: Wings over Moffet (Tel: USA 408 406 9559. http://www.wingsoverhistory.org/flyin.htm)				
51	La Crosse, WI: 2nd Annual Delta Slayton Air Show (Tel: USA 608 785 7631. http://www.airfest.com)				
52	Gunnison, CO: Gunnison County Airport Walsenburg, CO: Spanish Peaks Air Rodeo (Tel: USA 719 746 2310)				
53	Halle/Oppin, Germany: Great Warbirds & Oldtimer Airshow (Tel: Germany 3714 31980. http://www.flyinglegends.de)				
54	Hamilton, ON: Hamilton International Air Show (Tel: Canada 905 528 4425. http://www.hamiltonairshow.on.ca)				
55	Locarno, Switzerland: Air Display				
56	Santa Fe, NM: Santa Fe Air Show				
57	Westminster, MD: Jack B Poage Airshow 1999 (Tel: USA 610 486 7340. http://www.aviantic.com/poageshow.html)				
58	Willow Grove, PA: NAS/JRB Willow Grove 'Sounds of Freedom' Air Show '99				
59	Yakima, WA: Yakima International Air Fair (Tel: USA 509 248 0246)				
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24-25 **NAS Brunswick, ME:** The Great State of Maine Air Show 1999 (Tel: USA 207 865 0053)

24-25 **Springfield, IL:** 17th Annual Springfield Air Rendezvous Airshow (Tel: USA 217 789 4400) <http://www.springfield-airshow.com>

24-31 **Most, Czech Republic:** European Precision Flying Championships (Tel: UK 01728 668354)

25 **Elmendorf AFB, Anchorage, AK:** Armed Forces Open House 1999 Airshow (<http://www.afmndor.af.mil>)

25 **Prince George, BC:** Prince George Airshow (Tel: Canada 250 441 3313)

28-01 Aug **Jours, Holland:** Balloon Meet

28-03 Aug **Oshkosh, WI:** EAA AirVenture Oshkosh '99 Fly-in, Convention & Airshow (Tel: USA 920 426 5901) <http://www.eaaventures.org>

29-01 Aug **Buchholz, Germany:** Nordt Balloon Championships

29-01 Aug **Magdeburg, Germany:** Saxonia International Balloon Fiesta

30-01 Aug **MCAS Miramar, San Diego, CA:** MCAS Miramar Airshow (Tel: USA 619 537 4119)

30-08 Aug **Metz, France:** Lorraine '99 Balloon Meet

30-11 Aug **Chambley AB, France:** Lorraine '99 Hot Air Balloon Meet

30-15 Aug **Bayreuth, Germany:** World Gliding Championships (Tel: Germany 5104 699627)

31-01 Aug **McGuire AFB, Wrightstown, NJ:** Open House & Air Show

31 **Ionia, MI:** Ionia Free Fair Airshow

31 **Teuge, Netherlands:** Vliegfeest Teuge (Tel: Netherlands 1724 35627)

31-01 Aug **Avoca, PA:** Armed Forces Air Show (Tel: USA 570 855 3077) <http://www.favpp.com/airshow99/index.html>

31-01 Aug **Castlebar, Ireland:** Mayo Flying Club Fly-in (Tel: Eire 86 8314102)

31-01 Aug **North Bay Waterfront, ON:** North Bay Heritage Festival & Airshow (Tel: Canada 705 474 0400)

31-01 Aug **Red Deer, AB:** Red Deer International Airshow (Tel: USA 403 686 5050)

AUGUST

01 **Hechtel, Belgium:** 23rd International Sarcote Airshow (Tel: Belgium 11 342739)

01-08 **Svatouch, Czech Rep:** Balloon Fiesta

03-07 **Vilnius, Lithuania:** Balloon Meet

04-07 **Fond du Lac, WI:** IAC Championships & JS National Glider Aerobatic Championships (Tel: USA 920 426 6805)

04-08 **Castle Bourscheid/Michelau, Luxembourg:** Balloon Meet

06-07 **Borger, TX:** Airfair '99 (Tel: USA 806 274 2211) <http://www.borger.com/cvindex.html>

06-08 **Abbotsford BC:** Abbotsford International Airshow (Tel: Canada 604 852 8511)

06-08 **Hoganas, Sweden:** Vans RV Fly-in (Tel: Sweden 8750 1085)

06-08 **Rantoul, IL:** Rantoul Airshow (Tel: USA 217 367 0288)

07 **Seattle, WA:** Seafair '99 Airshow (Tel: USA 206 728 0123 x 112) <http://www.seafair.com>

07 **Chino, CA:** Planes of Fame Air Museum Women in Aviation Special Event (Tel: USA 909 597 3722)

07 **Fort Wayne, IN:** 122nd Fighter Wing Open House & Airshow

07-08 **Ankeny, IA:** Greater Des Moines Aviation Expo '99

07-08 **Barth, Germany:** Flying Legends Flugplatzfest (Tel: Germany 3714 31980) <http://www.flyinglegends.de>

07-08 **Medford, OR:** Rogue Valley International Airshow

08 **Abbeyville, Elre:** Air Display

10-12 **Vancouver, BC:** Aerospace North America (Tel: Canada 604 857 1630) <http://www.airshowcanada.com>

12-15 **Muncie, IN:** Summer Heat Hot Air Balloon Championship (Tel: USA 765 284 2700) <http://www.muncieintourism.com>

13-15 **Kansas City, MO:** Aviation Expo 98 (Tel: USA 816 322 0001)

13-15 **Quebec, PQ:** Quebec Air Show (Tel: Canada 418 627 5527) <http://www.spectacularaerien.ca>

13-15 **Ste-Foy-Jean Lesage, PQ:** Festival Aérien de Québec (Tel: Canada 418 627 5527)

14 **Dyess AFB, Abilene, TX:** Big Country Appreciation Day Airshow

14 **Kallispell, MT:** Glacier International Airshow

14 **Pope AFB, Fayetteville, NC:** Pope AFB & Fort Bragg Open House & Airshow

14-15 **Goshen, IN:** Skyfest Michiana '99 (Tel: USA 219 295 3177)

14-15 **Olen, Belgium:** Balloon Meet

14-15 **Johnstown, PA:** Johnstown Cambria County Air Show '99

14-15 **Reading, PA:** Reading Aerofest Airshow

14-15 **Saskatoon, SK:** Canada Remembers International Air Show (Tel: USA 306 975 3155 x 3151) <http://www.saskplace.sk.ca>

14-18 **Whiteman, MO:** Wings over Whiteman Airshow (Tel: USA 816 687 3215)

15 **Kristiansand, Sweden:** Air Display

15-26 **Niederoberndorf, Austria:** European Glider Championships

17-22 **Zhukovskiy, Moscow, Russia:** MAKS '99 4th International Aviation & Space Salon (<http://www.airshow.ru>)

20-22 **Frederick, MD:** Wings of Freedom Air Show '99 (Tel: USA 301 846 2201) <http://www.erols.com/rfln/vof/>

21-22 **Bielefeld, Germany:** Fly-in Old-Timer and Experimental Meeting (Tel: Germany 171 3855914) <http://www.flugplatz-bielefeld.de>

21-22 **Caboolture, Qld, Australia:** Air Spectacular (Tel: Australia 75495 3882)

21-22 **Chicago, IL:** 41st Chicago Air and Water Show (Tel: USA 312 744 7431) <http://www.ci.chi.il.us/wm/specialevents>

21-22 **Dittingen, Switzerland:** Air Display (<http://www.zurchli.ch.com/~strvgz/flugtag/1999/index.html>)

21-22 **Falmouth, MA:** Cape Cod Air Show (Tel: USA 508 548 6923)

21-22 **Grissom AFB, IN:** Grissom Airshow 1999 (Tel: USA 765 688 3367)

21-22 **Mont-Jolie, PQ:** Spectacle Aérien de Mont-Jolie (Tel: Canada 418 775 4788)

21-22 **Santa Rosa, CA:** The Magic of Flight Annual Airshow (Tel: USA 707 575 7900) <http://www.pacificcoastsmuseum.org>

21-22 **Ottawa, AB:** Red Deer International Airshow & Open House (Tel: USA 508 540 5700)

21-22 **Tullinge, Sweden:** Air Display - CANCELLED

21-22 **Westfield, MA:** Westfield International Airshow '99

21-23 **Fargo, ND:** Fargo Airshow 1999 (Tel: USA 701 235 5323)

22-23 **Erpent Namur, Belgium:** Balloon Meet

22-29 **Reims, France:** 90th Anniversary of the World's First Air Race

25-29 **Twenthe, Holland:** Twenthe Ballooning

26 **CFB Goose Bay, NF:** 5 Wing Open House

26-29 **Bydgoszcz, Poland:** Aerointerlot '99 (International Fair of Aviation & Astronautics) (Tel: Poland 52 345 6866)

26 **CFB Gander, NF:** 9 Wing Open House

28-29 **Cincinnati, OH:** Lunker Airfest (Tel: USA 513 271 1535)

28-29 **Debilit AFB, Poland:** Polish Air Force Open Days

28-29 **Langley, VA:** Community Appreciation Days (Tel: USA 757 764 4922) <http://www.langley.af.mil/public.htm>

28-29 **North Bend, OR:** Rotary Oregon Coast Air Fair (Tel: USA 541 756 5181)

28-29 **Offutt AFB, Bellevue, NE:** Thunder over the Heartland Airshow (Tel: USA 402 294 2030)

28-29 **Rochester, NY:** Rochester International Airshow (Tel: USA 716 262 2009)

28-29 **Rothenburg/Würmbe, Germany:** International Yak Meet (Tel: Germany 3714 31980) <http://www.flyinglegends.de>

28-29 **Sydney, NS:** Sydney Kinsman International Airshow

28-29 **Thunder Bay, ON:** Thunder in the Air Airshow (Tel: USA 807 625 2565)

28-29 **Westover AFB, Westfield, MA:** Great New England Air Show (Tel: USA 413 596 2534)

28-05 Sep **Bad Waltersdorf, Styria, Austria:** World Balloon Championships

SEPTEMBER

01-05 **Warstein, Germany:** German Gas Balloon Championships

03-04 **Hayward, CA:** Hayward Air Fair (Tel: USA 510 293 6676)

03-05 **St Niklaas, Belgium:** Balloon Meet

03-05 **Kirchheim-Teck, Germany:** Hahnwiede Oldtimer Glider and Aircraft Meet (Tel: Germany 7021 979660)

03-06 **Greenville, Jackson, MS:** Sky Parade '99 Airshow (Tel: USA 601 455 6397)

04 **Chino, CA:** Planes of Fame Air Museum Supermarine Spitfire Special Event (Tel: USA 909 597 3722)

04-05 **Beauvechain, Belgium:** Belgian Air Force Open Day

04-05 **Hradec-Kralove, Czech Republic:** Czech International Air Fest '99 (Tel: Czech Republic 2 6603 4676)

04-05 **Carpentras, France:** RSA Vaulcuse French Homebuilders Regional Rally (Tel: France 49020 3389)

04-06 **Chesterfield, MO:** St Louis Co Fair & Airshow (Tel: USA 314 530 9385)

04-06 **Cleveland, OH:** Cleveland National Air Show (Tel: USA 216 781 0208)

04-06 **Toronto, ON:** Canadian International Air Show (Tel: Canada 416 393 6061) <http://www.cias.org>

04-12 **Ravenna, Italy:** Rally Flying World Championships (Tel: UK 01728 778354)

05 **Cuatro Vientos, Madrid, Spain:** Fundación Infante de Orleans Flying Day (Tel: Spain 1508 0233)

06-10 **Denson, TX:** US National Aerobatic Championships

08-12 **Nitra, Slovak Republic:** International Balloon Meet

09 **Newton, IA:** Newton Air Show

09-12 **Ostsee Rostock, Germany:** Club International Robin Weekend (Tel: Switzerland 61 3123131)

10-12 **Altwater, CA:** 2nd Annual Golden West EAA Regional Fly-in (Tel: USA 530 642 8063)

11-12 **Dallas Love Field, TX:** FINA Dallas Air Show (Tel: USA 214 350 3660) <http://www.dallasairshow.com>

11-12 **Dublin, VA:** Skyfest Airshow (Tel: USA 252 447 8584)

11-12 **Grand Junction, CO:** Grand Junction Air Show '99

11-12 **Jerez de la Frontera, Cadiz, Spain:** FA Aerobatics Grand Prix (Tel: Switzerland 32721 2036)

11-12 **Peachtree City, GA:** Wings over Dixie '99 (Tel: USA 706 646 2473)

11-12 **Shearwater, Halifax, NS:** Nova Scotia International Air Show (Tel: USA 902 465 2725) <http://www3.ns.sympatico.ca/nsias>

11-12 **Smyrna, TN:** Tennessee Aviation Days (Tel: USA 615 399 3406)

11-12 **Syracuse, NY:** The 1999 Syracuse International Airshow (Tel: USA 315 454 3263)

11-12 **Toledo, OH:** Toledo Air Show '99 (Tel: USA 419 243 8191) <http://www.toledochamber.com>

12 **Dunaujvaras, Austria:** European Micro-light Championships

16-19 **Reno, NV:** 36th US National Championship Air Races (Tel: USA 702 972 6663) <http://www.airrace.org>

17-19 **Elmira, NY:** Wings of Eagles Air Show (Tel: USA 807 739 8200) <http://www.warplane.org>

18 **Beale AFB, Marysville, CA:** Beale Airfest '99

18-19 **Altus AFB, OK:** Open House Airshow

18-19 **Indianapolis, IN:** Miracle Fly-in & Airshow

18-19 **Liberal, KS:** The Great Mid-America Air Show

18-19 **Madford, NJ:** Air Victory Museum & Air Fair (Tel: USA 610 486 7340) <http://www.chesco.com/~shultz/>

18-19 **NAS Oceana, Virginia Beach, VA:** Neptune Festival Air Show (Tel: USA 757 433 3309) <http://www.oceana-navy.com>

18-19 **N Little Rock, AR:** Central Arkansas Air Show '99 (Tel: USA 501 562 5020)

18-19 **Scofield-Schenectady, NY:** Empire State Aerobatics Museum Flight '99 Airshow

18-19 **St Thomas, ON:** St Thomas International Air Show (Tel: Canada 519 659 3298)

19 **Chateaudun AB, France:** French Air Force Open Day BA279

24-25 **La Grange, TX:** The Fayette Air Show (Tel: USA 409 968 5756) <http://www.lagrangex.org>

24-26 **Springfield, IL:** Air Rendezvous (Tel: USA 217 789 4400) <http://www.springfield-il.com/airshow>

Stockton, CA: Wings over Stockton (Tel: USA 209 983 4800)

Maxwell AFB, Montgomery, AL: Maxwell Gunter Airshow (Tel: USA 334 953 7770)

Des Moines, IA: Wings, Wheels & Water Festival (Tel: USA 515 289 1439) <http://www.skysmith.com>

Luqa, Malta: Malta International Airshow (Tel: Malta 444089)

Panama City Beach, FL: Panama City Beach Aerial Circus (Tel: USA 850 233 5070) <http://www.panamacitybeachil.com>

San Marcos, TX: Gathering of Memories Airshow (Tel: USA 915 563 1000)

Wilmington, NC: Carolinas Air Expo Airshow (Tel: USA 910 341 4333)

Geraldton, Western Australia: Greenough Festival of the Air (Tel: Australia 9921 1811)

Charleston AFB, SC: Charleston Air Expo '99 Airshow (Tel: USA 803 963 5656)

Aspen, CO: Aspen Air Show (Tel: USA 970 925 2522)

OCTOBER

2 **Page, AZ:** Page Lake Powell Air Fair (Tel: USA 520 645 9373) <http://www.canyon-country.com>

Saknas, CA: California International Airshow (Tel: USA 830 754 1983) <http://www.ca-airshow.com>

Chino, CA: Planes of Fame Air Museum Messerschmitt Me 262 Special Event (Tel: USA 909 597 3722)

Allenstown, PA: Lehigh Valley Air Show

Coastville, PA: Chester County Airshow (Tel: USA 610 466 7340) <http://www.chesco.com/~shultz/>

Fresno, CA: Fresno International Air Classic Airshow

Great Bend, KS: High Plains Great Bend Airshow (Tel: USA 316 624 6405)

Midland-Odessa, TX: Confederate Air Force Airshow '99 (Tel: USA 915 563 1000) <http://www.avdigest.com/cal/cal.htm>

02-03 **Miramar, San Diego, CA:** International Air Show

02-03 **Santa Maria, CA:** Heroes 1999 Airshow

02-03 **Sioux City, IA:** Mid-America Air Show (Tel: USA 712 943 5325) <http://www.siouxcityan.com>

02-03 **Victorville, CA:** George Air Show

02-03 **Walla Walla, WA:** Wings over Walla Walla Air Show (Tel: USA 509 529 8147)

03 **Cuatro Vientos, Madrid, Spain:** Fundación Infante de Orleans Flying Day (Tel: Spain 1508 0233)

06 **Tucumcari, NM:** Tucumcari Rotary Club Airshow (Tel: USA 505 461 1200)

07-10 **Beijing, China:** Aviation Expo/China '99 (Tel: Hong Kong 2511 7427)

08-10 **Vancimont, Belgium:** Balloon Meet

09 **Rio Hondo, Texas:** Texas Air Museum Fly-in (Tel: USA 956 748 2112)

09 **Vance AFB, Enid, OK:** Vance Air Show '99

09-10 **Edwards AFB, CA:** Open House and Air Show (Tel: USA 805 277 1547) <http://www.edwards.af.mil>

09-10 **El Paso, TX:** Amigo Airshow (Tel: USA 915 545 2884)

09-10 **Fort Worth - Alliance, TX:** Fort Worth Air Show (Tel: USA 817 551 1967)

09-10 **Long Beach, CA:** Pierfest Sea & Air Show (Tel: USA 714 960 3378) <http://www.pierfest.com>

09-10 **Mesa, AZ:** 28th Annual Copperstate EAA Regional Fly-in (Tel: USA 602 827 4700)

09-10 **Muskogee, OK:** Muskogee Air Show (Tel: USA 918 683 4581 x 269)

09-10 **San Francisco, CA:** San Francisco Fleet Week Air Show

12-14 **Allants, GA:** NBAA Annual Convention (Tel: USA 202 783 9362)

16 **Seymour Johnson AFB, Goldsboro, NC:** Annus. Community Appreciation Airshow

16-17 **Ellington-Houston, TX:** Wings over Houston Airshow (Tel: USA 713 644 1016) <http://www.avdigest.com/cal/cal.html>

16-17 **Kirtland AFB, NM:** Open House '99 & Airshow

16-17 **Motegi, Japan:** FAI Aerobatics Grand Prix (Tel: Switzerland 32721 2036)

16-17 **Scottsdale, AZ:** Scottsdale AirFair '99 (Tel: USA 602 840 9005)

16-17 **Sheppard AFB, Wichita Falls, TX:** Open House & Airshow (Tel: USA 940 676 2733)

17 **Laughlin AFB, Del Rio, TX:** Air Amistad '99 Airshow

17 **Strathbryn, South Australia:** Southern Districts Flying Club Fly-in (Tel: Australia 885 362 070)

21-23 **Atlantic City, NJ:** AOPA Expo '99 (Tel: USA 301 695 2052)

23-24 **Fort Huachuca, AZ:** Sierra Vista International Air Show (Tel: USA 520 515 3949) <http://www.airshowsnevadavista.com>

23-24 **Little Rock AFB, AR:** Open House & Airshow (Tel: USA 501 987 3353) <http://www.littlerock.af.mil>

29-31 **NAS/JRB New Orleans, LA:** N'awlins Air Show (Tel: USA 504 878 3231)

30-31 **Moody AFB, Valdosta, GA:** Moody Community Appreciation Day Airshow

06-07 **Fort Smith, AR:** Air Show (Tel: USA 501 846 1681)

06-07 **Lake Charles, LA:** Louisiana National Airshow

06-07 **NAS Jacksonville, FL:** NAS Jacksonville International Air Show (Tel: USA 904 542 3111)

07 **Cuatro Vientos, Madrid, Spain:** Fundación Infante de Orleans Flying Day (Tel: Spain 1508 0233)

12-13 **NAS Pensacola, FL:** Blue Angels Homecoming Airshow (Tel: USA 850 452 3506) <http://www.mwr-pcola.navy.mil>

13 **Lake AFB, AZ:** USAF Open House (Tel: USA 602 856 6181)

13 **Rio Hondo, Texas:** Texas Air Museum Fly-in (Tel: USA 956 748 2112)

13-14 **Lake City, FL:** North Florida Chantry Air Show (Tel: USA 904 752 1822 x 1201)

13-14 **Stuart, FL:** Stuart Air Show (Tel: USA 561 288 7092)

14-18 **Dubai UAE:** Dubai 2000 Airshow (Tel: UAE/Dubai 822855)

17-21 **Tokyo, Japan:** Tokyo Aerospace 1999

20 **Mildura, Victoria, Australia:** Mildura Air Show (Tel: Australia 5021 9152)

30-5 Dec **Langkawi, Malaysia:** LIMA '99 (Tel: Malaysia 3238 5866)

NOVEMBER

03-05 **Bangkok, Thailand:** Delance Asia '99 (Tel: Singapore 278 8666)

05-06 **Zephyrhills, FL:** Zephyrhills Air Show (Tel: USA 813 782 1913)

06 **Bitoli, MS:** Keesler AFB Open House (Tel: USA 610 456 7340) <http://www.keesler.af.mil>

06 **Chino, CA:** Planes of Fame Air Museum Early Jets Special Event (Tel: USA 909 597 3722)

06 **Galveston, TX:** Lone Star Flight Museum Homecoming Fly-Day (Tel: USA 409 740 7722) <http://www.1stfm.org>

DECEMBER

04 **Chino, CA:** Planes of Fame Air Museum A6M5 Zero Special Event (Tel: USA 909 597 3722)

06 **Cuatro Vientos, Madrid, Spain:** Fundación Infante de Orleans Flying Day (Tel: Spain 1508 0233)

07 **Rio Hondo, Texas:** Texas Air Museum Pearl Harbor Re-enactment (Tel: USA 956 748 2112)

11 **Rio Hondo, Texas:** Texas Air Museum Fly-in (Tel: USA 956 748 2112)

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With just two examples in existence, the McDonnell XF-85 Goblin was always on the verge of extinction. However, at the SAC Museum near Omaha, Nebraska, thousands of hours of work have resulted in the restoration of one of the strangest and intriguing aircraft to have ever flown. **ROBERT F. DORR** tells the tale

Under the guidance of retired Chief Master Sgt Denny Haun, a team of volunteers elected to rebuild and refinish XF-85 Goblin 46-524, the second of two prototypes built of this fascinating aircraft. The aircraft had been in the Omaha area for many years wearing inaccurate markings, and had fallen into what a local resident called 'shoddy condition'. Now, the XF-85 will be displayed at the SAC Museum, which is located on Interstate Highway 80 between Omaha and Lincoln and operated by the Strategic Air Command Society.

The XF-85 was the only American aircraft designed from the outset as a 'parasite fighter'. It could be launched from and retrieved by another aircraft in mid-flight, as detailed in the September 1998 issue of *AI*. Had it proven successful, a production F-85 would have been carried in the bomb bay of Strategic Air Command B-36 bombers.

The aircraft had folding, swept wings of 21 ft 1-1/4 in (6.44 m) span, a short rotund fuselage, and a retractable hook (skyhook) to engage a trapeze on the parent aircraft.



Top: The final step in restoration of the tiny McDonnell XF-85 Goblin parasite fighter (46-524) was the installation of a replica canopy that had to be custom-made. The 'hook' that enabled the aircraft to link up with a B-29 bomber in flight can be clearly seen in this view. Dick Austin via Robert F. Dorr

Above: McDonnell test pilot Edward Schoch (left) poses with the XF-85 Goblin in 1948. Schoch was the only pilot who ever flew the Goblin. He lost his life in an F2H Banshee crash in 1951. McDonnell via Robert F. Dorr

Power was provided by a 3,000lb (1361kg) thrust Westinghouse J34-WE-22 turbojet mounted to the rear fuselage. The tiny fighter also had a perforated, 'cheese grate' speed brake which extended below the lower rear fuselage and was one of the first such speed brakes on a jet fighter.

The first example flew only once, while the second aircraft flew six times over a period of eight weeks in 1948. In this period, it logged just over two hours of flight time and made three successful hook-ups

with a B-29 Superfortress 'mother ship'. Three other flights ended with belly landings on the dry lake bed at Muroc, Ca.

McDonnell's Edward Schoch was the only pilot who ever flew the aircraft. Ironically, the other XF-85 logged more air time as an item of cargo than as an aircraft. The two Goblins were brought to California from the McDonnell factory in St Louis, Mo, aboard C-82 and C-97 transports

The other XF-85 (46-523) is located at the Air Force Museum in Dayton, Ohio.

AIR VIEW

The latest news and views on the aircraft preservation scene as compiled by
PETER R. MARCH



Lightning return

The event that Lightning enthusiasts from all over the world have long awaited took place on 9 March at Cape Town, South Africa, when the first of **Mike Beachy Head's** Lightnings, was flown for the first time. Keith Hartley was at the controls of T5 XS452 with Mike Beachy Head

occupying the second seat. After thundering down Runway 19 at Cape Town International Airport and into a strong headwind, Keith gently lifted the nose at 12.40hrs and headed the immaculately restored Lightning south and towards the Test Flight and Development Centre (TFDC) near

Above: Resplendent in black, Lightning T5 XS452 undergoes flight preparation within Mike Beachy Head's impressive hangar building at Cape Town International. Ian Black

Left: The moment of truth approaches — 'Bravo Tango' being readied for its first flight in the Cape skies. Frank Du Plessis

Right: Glorious sight — Lightning ZU-BBD (XS452) taking off from Cape Town International Airport for the very first time after recent shipment to South Africa and painstaking re-assembly. Frank Du Plessis



Bredasdorp in the Southern Cape. After overflying the Overberg region and circuiting the base, the aircraft touched down on Runway 17 at 13.15hrs. The airspace at TFDC is far less congested than Cape Town International and is ideally suited for testing the Lightning. The aircraft has been painted in

the Beachy Head black scheme but the RAF and No 11 Squadron unit markings have been retained. The fin badge, comprising a black rectangle and superimposed yellow diamond and two eagles, shows up extremely well and results in a very attractive overall appearance. The Lightning will no doubt form an outstanding addition to Mike's existing fleet of Hunters and Buccaneers.

Having been lovingly cared for by Tony Hulls following its retirement from RAF service, XS452 was moved to South Africa in 1997 after years of vain effort to persuade the UK CAA to issue a Permit to Fly. It will be followed into the air by a further T5 and two F6s in due course

Bulldog spirit

After painstaking restoration to static display condition by **Skysport Engineering**, the **Bristol Bulldog** K2227 was rolled out on 12 March, ready for transportation to the RAF Museum at Hendon before Easter. The historic Bulldog IIA crashed at Farnborough on 13 September 1964 and was very badly damaged. The aircraft was originally built at Filton as a company demonstrator and development machine, registered G-ABBB. It never saw military service but was restored to flying condition in 1961 and painted as a No 56 (F) Squadron Bulldog, with the serial K2227.

There was not a great deal of the original structure remaining undamaged after it hit the ground during a low-level loop during the 1964 SBAC airshow. The basis of its rebuild by Skysport were two lower mainplanes held in store by the RAF Museum and as much of the wreckage as could be collected together over the past 30 years, plus some additional parts generously donated to the project. A number of parts from five Bulldogs liberated from a scrapyard in Shropshire were also used in the four-year rebuild.

The aircraft has been returned to stock Bulldog IIA configuration and is complete in every detail. Where possible original parts from 'BB have been incorporated, even to the extent of splicing severed control cables to new cable. The quality of the rebuild is quite outstanding and measures up well to the exhibits at Hendon alongside which it will take its place.

The beautifully restored Bristol Bulldog K2227 was rolled out on 12 March, ready for transportation to the RAF Museum at Hendon before Easter. Ian Frimston





Let's hope that *Fifi* is up and about again soon. PRM

Fifi grounded

The Confederate Air Force's Boeing B-29 Superfortress *Fifi* has a major problem and has been grounded pending a full inspection of its wings. A planned tour, which was to have included Canada and Alaska this summer, has been postponed. A possible visit to the UK in 2000 is now very much in jeopardy also.

During the winter a fuel leak was discovered in one of the B-29's wings. Although the cause of this was found and the leak stopped, this has raised suspicion about possible damage to one of the many fuel cells in the Superfortress' wings. The CAF at Midland, Tx, has decided to make a full inspection of both wings, and while looking at the fuel cells, carry out an examination of the full structure.

Since Boeing has said that it will not be able to help with any repairs, the CAF has approached Hawkins and Powers at Greybull, Wy — a specialist company — to assess the problem. *Fifi* will probably be ferried to Wyoming for the work to be carried out. If all goes well it is hoped that it will be completed by the end of the year.

Nice Beaver

After flying a DHC Beaver while making the movie *Six Days and Seven Nights*, actor Harrison Ford decided to buy one. He acquired the aircraft in Denver and took it to Kenmore Air Harbor's Lake Washington facility where he has had it restored to his own precise specification.

A former US Army U-6A (54-1709), it was only used for a few years before being stored at Davis-Monthan AFB, Az. It was put up for sale in 1971 and purchased by the West Nebraska Technical College, Sidney, Ne, where it was used as an instruc-

tional airframe for 15 years. Following this it passed into private hands in the mid-1980s, moving between several owners until it caught Ford's attention.

No expense has been spared with its restoration. The Beaver has been fitted with a new 450hp Pratt & Whitney R-985-AN radial engine and a modern cockpit with a full avionics suite. To give the Beaver the best performance, whether it is fitted with wheels or has floats for operation off water, it has a Baron STOL kit. Repainted in a striking two-tone green and yellow paint scheme the Beaver took to the air again recently and was due for delivery to its owner in March.

Lone Star Flight Museum

Once again we are grateful to Ralph Royce, CEO of the Lone Star Museum at Galveston, Tx, for this up-date on the various projects at this leading US museum. On 4 February, ceremonies were held for ground breaking of Phase III of the Texas Aviation Hall of Fame — the first step in the next generation of the museum. This new TAHF facility will stand as a landmark to the evolution of flight from the earliest days at Kitty Hawk to the 21st century exploration of space. It will also recognise those individuals from Texas that have made a significant contribution to the development of aviation. The official opening of the new gallery is scheduled for the end of 1999.

Recently Jim Harris, a Museum member presented his *Bleriot XI* non-flying replica to the TAHF. Built at nearby Seabrook, the replica was constructed after months of meticulous research. This is the third project completed by Mr Harris for the Museum. The other two are half-scale models of the Wright Flyer and a Japanese Ohka flying bomb, which are currently on display.

Spitfire LFXVie TE392 will soon be back at the Museum. Assembly of the primary aircraft structure is finished. Detailed system installation and integration is 99% complete. Coolant tubes received from the UK have been installed and the first run-up of the Merlin engine is scheduled for the spring

installed two additional Lycoming GSO-480 engines outboard of the two radials and the aircraft became known as the *Bird Innovator*. He operated the unusual aircraft from 1966 to 1977 as a flying sales office and classroom for the medical equipment that he marketed. It spent the next two decades with various owners in Florida and New Mexico before arriving in Oregon.

● Consolidated *PBY-5A Catalina* VP-BPS that was owned by Plane Sailing Air Displays Ltd at Duxford since February 1985, is to be restored after all to airworthy condition. Following its crash in the Solent last July, the future of the Catalina, as a flying example, appeared somewhat doubtful.

The amphibian was put up for sale by the insurance underwriters, Airclaims. It has now been purchased by a three-man syndicate comprising former BAe, Dan-Air and RAF engineers. The three are currently employed by Aeroservices at Hamble, where the Catalina has been resident on its slipway since the accident. The bulk of the damage to the aircraft was actually sustained during the recovery operation. The engines have been returned to the US for a total rebuild by the Aircraft Cylinder and Turbine Co of California. Where the Catalina will be rebuilt to flying condition is still uncertain, but the most likely bases are either Dunsfold or Lasham. The team aims to get the Catalina back into the air by the late summer.

Cat-call

● The famous four-engined Consolidated *PBY Catalina* — N5PY the *Bird Innovator* — is being converted back to its original twin-engine configuration. Present owner, Ron Ruble of Aurora, Or, purchased the Catalina in 1997 but considered the second set of engines made the aircraft too heavy and too complicated to operate. Currently these third and fourth engines are being removed and when the wings are patched up N5PY will take to the air again as a stock Catalina.

Manufactured in 1941 as a PBY-5A s/n 417, it went to the Royal Canadian Air Force as RCAF 9746 and served with No 162 Squadron. Post-war it was registered to the Bird Corporation, Palm Springs, Ca, in November 1958 as N5907 and initially named *The Wandering Albatross*, but it was damaged in a wheels-up landing at Memphis, Tn, in December 1963. A series of engine problems convinced the owner that the PBY could benefit from a bit more power, so Bird

Spitfire update

Spitfire FRXIVe TZ138/N5505A is undergoing a major restoration at Van Nuys Airport, Ca, and should make its post-restoration flight in the near future.

This Spitfire has under 100 flying hours in total. It was shipped to the Royal Canadian Air Force in January 1945 for 'winterisation' trials. Sold as surplus in 1948, it became CF-GMZ and was the only Spitfire to race at the Cleveland National Air Races. Subsequently moving to Florida, it had a chequered history, including being damaged by Castro supporters during a aborted smuggling attempt to Cuba in 1951!

It then found its way into Confederate Air Force hands at McAllen, Tx, and was stored for seven years from 1963. Following a restoration programme, it flew again in May 1970 (the last time it was airborne), but crashed on its first flight — being damaged in a forced landing in Mexico. The following year TZ138 was transported by road to Ontario, Canada for restoration to static display condition.

Returning to the US again in 1979, it was exhibited for at the Lone Star Flight Museum at Galveston, Tx. In January 1992 it was trucked from Texas to California to commence restoration by its new owner Pete Regina.

The engine is the same Rolls-Royce Griffon with which the aircraft left the factory, and has been overhauled by Mike Nixon's Vintage V-12s establishment. It has now been refitted to the airframe and engine runs made. Unfortunately the original Dowty Rotol five-bladed wooden propeller was no longer airworthy, and engine runs were made with a borrowed outside four-blade Fairey Firefly propeller. The Museum of Flying holds a spare set of new Hoffman blades and these will probably be fitted to N5505A's hub for initial flight test work, while the original blades are overhauled.

Ford flies on

Since last autumn, visitors to the Planes of Fame Museum at Chino, Ca, have had the opportunity to view a rare, airworthy Ford Tri-Motor. Normally based at Valle-Williams Airport south of the Grand Canyon, Az, it is usually on show at the recently established Planes of Fame Museum there. In October, however, John Seibold (the proud owner) let museum president Steve Hinton fly the Tri-Motor down to Chino to give enthusiasts a chance to see the venerable transport.

A total of 199 Tri-Motors were manufactured before production ended in 1933 and Ford got out of the aircraft manufacturing business — although during WW2, Ford was drafted to build Consolidated B-24 Liberators under licence at its plant in Willow Run, Mi. Ruggedness and an ability to get in and out of small, remote fields made the Ford Tri-Motor ideal for bush flying in Alaska and Canada. Despite operating in these primitive conditions, a handful of them still survive. John Seibold's Tri-Motor, a Model 5-AT c/n 74, was first flown in September 1929 and operated by the Ford Motor Co until being sold to Pan Am in 1932. The first Ford Tri-Motor to be fitted with floats, it was operated by the airline until 1940, then leased to Cia Mexicana de Aviation for a year before being sold to Aerovias de Guatemala as a cargo-hauler in May 1941 and operated in that country for the next 10 years.

After a period crop-spraying until 1957, it was sold to an aircraft broker in Memphis. TWA leased it in 1963 for a commemorative flight along its Los Angeles-Newark route. Afterwards, it was sold to American Airlines for promotional use. In the early 1970s, the Ford was pur-



The beautiful Ford Trimotor is back in the air once again. Although it still wears Scenic colours, the president of Grand Canyon Airlines now owns the aircraft. Frank B. Mormillo

the time, Seibold bought into Grand Canyon Airlines in 1975 and subsequently became aware of the company's Scenic Airways background.

To commemorate America's bicentennial, Scenic acquired another, older, Tri-Motor 5-AT (c/n 11) in January 1976. Seibold acquired c/n 74 in August 1977 when the 'new' aircraft was being overhauled. In 1993, Seibold sold Scenic Airlines to Skywest, though he continued to operate Grand Canyon Airlines with a fleet of de Havilland Twin Otter 'Vistaliners' out of Grand Canyon National Park Airport in Arizona. He kept c/n 74 in Scenic colours and still uses it for promotional and sightseeing tours.

Dubbed the *Tin Goose* because of its corrugated metal skin (actually duraluminum with a tensile strength of 55,000 psi), the Ford Tri-Motor was America's first all-metal airliner and set the standard for aerial passenger service in its day. By 1929, production was up to four planes a week at Ford's Dearborn, Mi, plant. Variants saw service with more than 100 airlines in the USA, Canada, Mexico, Central and South America, Europe, Australia and China. FRANK B. MORMILLO

Show Me the way

The North American B-25J Mitchell *Show Me* (44-31385/N3481G), owned and operated by the Missouri Wing of the Confederate Air Force since 1985, has been given a '21st Century' paint job, according to a recent Boeing news item.

Boeing employees and suppliers, 47 staff — including managers, engineers, artists and machinists — worked 600 hours

over a two-week period in late January and early February to make the aircraft look new. Working after hours, they washed down the bomber and applied over 20 gallons of paint to the wings, fuselage, engines, the nose art and national markings.

The B-25's grey and green camouflage paint scheme was the first practical test of a new paint developed by Boeing supplier PRC-Desoto International. The quick-drying, high-durability paint was so satisfac-

tory on the B-25 that Boeing officials apparently decided to have it certified for use on current production aircraft, such as the F/A-18 Hornet.

The Mitchell was originally delivered to the USAAF as 44-31385 and used as a trainer (TB-25J) after the war. It passed into civilian ownership at Grafton, WI, in 1963, and had three owners before being damaged in a storm at Seymour, In, in 1969. The B-25 remained grounded until 1975, when it was restored, flying again in the following year. It was operated by Air Classics Inc at St Charles, Missouri from March 1983 until acquired by the CAF two years later. Restored by the Missouri Wing, it remains based at St Charles and continues to fly as an even smarter *Show Me*.

Lightning lawsuit

A lawsuit has been filed following the crash of P-38 Lightning on 6 June 1997, in which the well-known author, journalist and photographer Jeff Ethell was killed.

It is sad to report that Federal civil action has been reportedly instigated by the P-38's owner Bruce Pruett of Livermore, Ca, against the estate of Jeff Ethell — and also against Tillamook Naval Air Station Museum and warbird collector Jack Erickson. The suit is not only seeking \$5 million in punitive damages plus some \$2 million as the market value of the crashed aircraft, but also seeking the replacement of the Lightning with a like aircraft (of value and quality).

Pruett originally rescued two P-38s from a scrapheap that then languished in storage for over 20 years. It was intended that Erickson, who has a large collection of warbirds at Tillamook NAS, would restore both Lightnings and keep one as payment.

The crash date was the official public unveiling of the P-38 after a lengthy restoration. The accident report stated that the aircraft spun in after the failure of one engine — possibly due to improper fuel management by the pilot — and not maintaining sufficient airspeed on the remaining engine.

The lawsuit is also questioning the type rating held by Erickson and Ethell to fly the P-38 in the 'limited' category, and whether this flight breached the lease agreement by flying the Lightning without due authorisation.

Dakota Club

The Dakota Club has been formed at North Weald to keep DC-3 N47FK in flying condition. The plan is to invite people to join as a crewmember and flights will be made available to them, subject to weather and operational conditions, rather like the early days of the Dutch Dakota Association. Meetings will be arranged for crew members once a month and training will be provided in a variety of topics such as evacuation tech-

chased by airshow pilot Chuck LeMaster. When he retired from barnstorming and airshow work with it, he sold the vintage plane to Scenic Airlines of Las Vegas, Nv.

Although it still wears Scenic colours and titles, it is now owned by John Seibold, president of Grand Canyon Airlines. That's where the Ford's pedigree gets a bit confusing. Although Grand Canyon Airlines was originally founded as Scenic Airways in 1926, it is not directly related to Scenic Airlines, the company that currently flies sightseeing tours of the Grand Canyon out of Las Vegas. The Chairman and CEO of Scenic at

the time, Seibold bought into Grand Canyon Airlines in 1975 and subsequently became aware of the company's Scenic Airways background.

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niques, safety, marshalling, security and fire control, which can then be put to use when visiting events and airshows in the UK and mainland Europe.

The Dakota, or rather more correctly the Douglas DC-3, in question was built at Long Beach, Ca, in 1943 for the USAAF as 42-23838 and delivered on 15 June 1943. After being declared war surplus in July 1946, the aircraft was modified in 1951 and used for many years by Proctor & Gamble Distribution Inc of Cincinnati, Oh, as N3PG. In the late 1960s it passed to other American owners and then went to Canada as CF-EEX.

In 1995 MLP Aviation at Elstree obtained the DC-3 for use in films. Now named *Fifi-Kate* it has now found a new lease of life with European Flyers, which intends to restore the aircraft to its original state — with the help of a number of DC-3 enthusiasts who have come forward. Currently the aircraft is taking part in a Kenneth Branagh film production of the Shakespearean comedy 'Love's Labour Lost' — the time scale of which has been brought forward to the 1950s!

The Dakota Club's joining fee is £50, with an annual subscription of £120. For further information tel 0118 983 1776; fax: 0118 983 3744 or e-mail dakinfo@eurofly.co.uk.

Wright stuff

With the 100th anniversary of powered flight fast approaching (2003), it is hardly surprising that the number of Wright Flyer replicas appearing around the world is growing apace. A 'new' replica Wright Flyer is now on display at the **Wings of Historic Aircraft Museum** at South Country Airport at San Martin, Ca. This little-known museum is run by the Northern California Antique Aircraft Association, and is affiliated to the Watsonville Antique Fly-In and airshow. The realistic replica even features Orville Wright at the controls.

Meanwhile, the **National Aeronautics and Space Administration** is conducting wind tunnel tests on a full-scale replica of the historic Wright Flyer. The test results will be used to compile a historically accurate aerodynamic database of the world's first powered aircraft. Upon completion of the tests, the replica will be transported to Los Angeles, where it will be displayed in the lobby of the FAA's Western Pacific Regional Office. Using the wind tunnel test data, a second replica of the Wright Flyer will be built by volunteers and flown on 17 December 2003, to commemorate the 100th anniversary of the first flight.

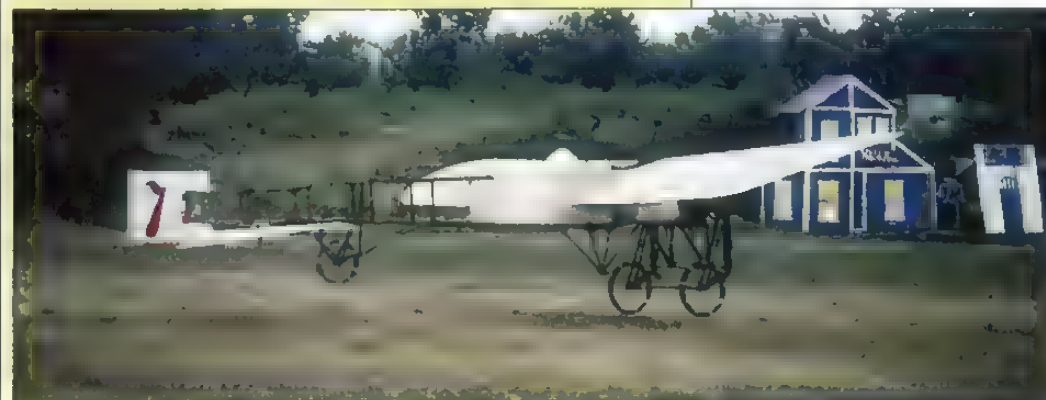
Old Rhinebeck

The late Cole Palen's **Old Rhinebeck Aerodrome** at Rhinebeck, NY, will again be featuring over 30 air shows on the weekends this summer from 19 June to 17 October. These include displays from some of the oldest flying aircraft in the United States (a Bleriot XI of 1909) to aircraft of the Golden Age of Aviation. Numerous rotary-powered WW1 types will be flown in mock dogfights each week. The Collection includes some 60 pre-WW2 aircraft, plus over 50 pre-1930 vehicles. On Saturdays, the airshow features the 'History of Flight' and the Sunday shows present WW1 flying displays.

The special events this year are: Sunday 19 June — the 1999 opening day and History of Flight Air Show; Saturday and Sunday 17/18 July — the Golden Age Biplane Fly-In; Saturday 18 September — Pioneer Day and Aviation Artists; Sunday 17 October — WW1 Air Show (final show of the season).

For further information tel: (USA) 914 758 8610 or visit their website @ www.olderhinebeck.org.

Old, old Rhinebeck! The original Bleriot XI is of 1909 vintage. Howard Levy



Newly refurbished Hurricane IIC PZ865 resplendent in its new south-east Asia colours at St Athan in early March. Robby Robinson

Hurricane force

From 4 March 1999 the **Battle of Britain Memorial Flight** once again had two fully airworthy **Hawker Hurricanes** on strength. The second of these precious aircraft (PZ865) returned to RAF Coningsby after spending the winter at RAF St Athan having its six-yearly major service. Surprisingly this was the first time that PZ865 has been serviced by the RAF.

The Hurricane was flown to St Athan on 23 September 1998 for the five-month overhaul. The first task was to remove its Rolls-Royce Merlin engine which was taken back to Coningsby for servicing. The main structure of the aircraft, with the exception of the fabric covered fuselage and control surfaces, was then stripped of paint to facilitate a full survey and and to assess the extent of any

repairs. A specialist contractor, Clive Denney of Vintage Fabrics did the fabric stripping from the fuselage, and the control surfaces were removed and transported to his workshops for refurbishment. When the repair work was complete, he recovered and doped the fabric and the control surfaces were replaced. Gradually the aircraft took shape again and the last item to be fitted was the Merlin engine returned from Coningsby. Following a number of engine runs, the first flight took place on 4 March, the pilot being Paul Day. Finding only one minor fault in a temperature gauge, he accepted the Hurricane and promptly flew it back to Coningsby the same day.

Hurricane PZ865 now wears the colours of an RAF WW2 South East Asia Command (SEAC) Hurricane of No 5 Squadron, with the code letter Q, as operated by the squadron from mid-1943 to mid-1944. This will complement the Spitfire already in SEAC colours and also commemorate the squadrons and men who served in the Far East in WW2. It will also provide a contrast to the other newly rebuilt Hurricane (LF363) in European colours with which it will appear during the year for the first time since 1991.

Built at Langley, Bucks in July 1944 as a Hurricane IIC, PZ865 was the last Hurricane to be made and aptly named *The Last of the Many*. Never taken on strength by the RAF, the aircraft was bought by Hawker from the Air Ministry. After the war it was registered as a civil aircraft G-AMAU and painted in a royal blue and gold colour

Larry the Lionheart

The **Lionheart** is an all-composite home-build biplane which was inspired by the Staggerwing of the 1930s. Powered by the same engine as the famous Beech, a 450hp Pratt & Whitney P-985, it seats six people.

In 1993 Larry French decided he wanted a 'six-place aerial minivan with Malibu capabilities on a Warrior budget'. Forming **Griffon Aerospace** in Harvest, Al, he created the Lionheart — a Staggerwing-inspired look-alike. Its laminar flow biplane wings are strutless — French wanted the two-wing configuration to give the necessary wing area for the low-stall speed he was seeking, and ailerons and flaps are fitted to both the upper and lower wings. It has a fully retractable landing gear.

Although the R-985 Wasp Junior was chosen — because of its availability, reliability and affordability, not to mention its ability to run on auto fuel — French is giving consideration to alternative engines such as the 360hp radial (that powers most Sukhoi aerobatic aircraft) and a General Motors HO-502-V8. The airframe is made up from composite materials since they give a better weight-to-strength ratio.

The Lionheart comes in four sub-assembly kits and it is estimated that it can be put together in 2,000 hours. The prototype has completed 150 trouble-free flight hours since July 1997. The kit price is around \$89,000 — for further information tel: USA (256) 721 9055 or look at the web site on www.griffon-aerospace.com.

scheme (the racing colours of HRH The Princess Margaret). In this guise it took part in several air races and was placed second in the 1950 Kings Cup Air Race. Between racing it was used in a number of films and as a company communications and test aircraft. During the 1960s it was used as a chase aircraft on early flights of the P1127, the forerunner of the Harrier. When the Hurricane could no longer match the jets as a chase, Hawker gave it a first overhaul and presented it to the Battle of Britain Flight which was then at RAF Coltishall. It has since remained active with the Flight, appearing in new colour schemes after each of its major overhauls. **ROBBY ROBINSON**

Brits in Germany

A growing number of former British civil and military aircraft have found new homes in German aircraft museums. The **Leo and Peter Junior Museum** at Hermeskeil, started by (yes I've guessed it), Leo Junior, is situated in the picturesque Eiffel mountain region close to the border with Luxembourg. The collection has around 100 aircraft ranging from large airliners, such as a **Vickers VC-10** and a full-size wooden Concorde replica, to light aircraft, gliders and even one of Ken Wallis' **Autogiros**. Former RAF aircraft based in Germany are well represented by **Canberra B(1)8 XM264**, **Lightning F2A XN782**, **Hunter F6A XF418** and **Hunter T4 XW927**. There is also a trio of **Whirlwind HAR10s** and a **Percival Pembroke**. Three halls contain the early aircraft with the remainder well laid out outside. Although now situated next to a new large motorway, it is interesting to ponder on how most of the aircraft arrived along the then-small rural roads.

The **Manfred Pflumm Collection** at the airfield of Villingen-Schwenningen did not have such difficulty. Manfred Pflumm started making replicas for other museums, then decided to set up his own museum. The collection has a



The sleek Yak-3 receiving modifications at Mojave. PRM

Yak-3 ready

A **Yak-3UA** has been acquired by the **Museum of Flying** at Santa Monica, Ca. The fighter is one of some 20 new-batch of aircraft built in a 1990 contract with the Gunnell Museum in Santa Monica by the Yakovlev Aircraft Corporation of Russia. The first of the batch, powered by an Allison engine (c/n 07040101), it was painted in wartime frontal livery and was displayed at the 1993 Paris airshow.

Since arriving in the US, and registered NX854DP, the Yak has had considerable modifications at Mojave to bring it up to 'western' standards. It is now painted as a Yak-3 flown by Rene Challe, who commanded the 4e and subsequently the 1ere *Escadrilles* of the Normandie-Niemen Regiment. Receiving the Yak-3 in July 1944, the regiment destroyed 119 enemy aircraft in a 10-day period in October 1944, proving the excellence of this low-altitude interceptor.



Lightning F2A, XN782, is one of the 'Brits abroad'. Nigel Hitchman

number of British-built aircraft, including a **Sea Hawk**, **Canberra**, **Vampire** and **Saro Skeeter AOP12**. Manfred Pflumm's aim is to cover the many features of aviation, from gliders and microlights to fighters and bombers. This now includes quite a number of unusual types, one of the most interesting being the **Winter LF-1**

Zaunkönig D-EBCG. Four of these parasol-winged light aircraft were constructed during WW2, but it did not go into production. One other example still survives, the former G-ALUA, which was evaluated in the UK and became the first Ultra Light Association (now PFA) aircraft, now displayed in the Deutsches Museum at Munich.

In the Navy

Four ex-Fleet Air Arm aircraft have recently been on the move. **Supermarine 544 Scimitar F1 XD332**, which has been at the Flambards Village Theme Park at Helston, Cornwall for a number of years, is now with the **Southampton Hall of Aviation**. It will eventually go on display in

Wild Horses

The first customer-built Thunder Mustang has made its maiden flight. The aircraft, owned by Tommy Rose, is now undergoing a flight test programme. The two-seat Thunder Mustang is the fastest homebuilt kit in production today, with a cruise speed of 300kts. For more information on the Thunder Mustang, check-out the following web-site: www.thundermustang.com

the R. J. Mitchell and Joseph Smith area, alongside the Spitfire F24 PK683/7105M and Supermarine 56A, of Schneider Trophy fame.

Another aircraft disposal by Flambards, as part of a planned reduction of airframes held on site, is **Westland Wasp HAS1 XT427** that has gone to the **Fleet Air Arm Museum** at RNAS Yeovilton.

The Yeovilton Museum has finally found a buyer for the recently stored **McDonnell Douglas F-4S Phantom 155848**. This has gone to the **Museum of Flight at East Fortune**. This ex-US Navy/Marine Corps Phantom was originally received in exchange for Scimitar F1 XD220 in the mid-1980s, which is now on display on the USS *Intrepid* in New York City, as part of the *Intrepid Air-Sea-Space Museum*.



Scimitar F1, XD332, when on display at the Flambards Village Theme Park, has now been moved to Southampton. PRM



Santa Monica's P-38 Lightning making a rare appearance, enjoys the sunshine at Mojave (see below). PRM

Round-up

● The **Zero** that was under restoration by **Flight Magic** in Russia from parts recovered from Indonesia, and temporarily housed with OFMC at Duxford, was moved to **Fighter Builders** at Chino, Ca, in late 1998. It is now being prepared to fly this summer.

● The **Brooklands Museum** has acquired **Mike Beach's Scud I** glider replica, while the **Scud II** remains on loan, but is for sale. A large collection of Sopwith drawings and Hawker archives — including Hawker production records have also been acquired.

● After five years restoration by the **Association Francais D'Avions Historique** at Le Castels in southern France, **Douglas AD-4NA Skyraider** Bu 127002/F-AZHK has flown again. Operated by the *Armee de l'Air*, it flew as No 61 and subsequently went to Gabon as

127002/TR-4QE in 1977. It was recovered by the late Michel Gineste in 1992 and was with Flying Legends at Dijon-Longvic, before going to the Salis Collection at La Ferte Alais. It is now finished as USN 127002/G-618.

● **Warbird Recovery Inc** at Jefferson County Airport, Broomfield, Co, has obtained five **Messerschmitt Bf109** airframes from Russia for restoration. The five, which still have their original Daimler-Benz engines, comprise a Bf109E-7 and four Bf109F-4s. The search for former US fighter types suitable for recovery and ultimate restoration started in the summer of 1993 in Siberian Russia.

● At Kemble, the **Bristol Aero Collection** is planning an official opening of its premises on 1 May. Although this establishes the BAC some 25 miles away from its natural home at Filton, it still has the ultimate aim of finding a home at

the BAe site. The 50th anniversary of the first flight of the giant **Bristol Brabazon** will be marked by the BAC on 4 September.

● The airworthy **Lockheed P-38L Lightning** 44-26996/N5596V currently held by the **Museum of Flying** at Santa Monica, Ca, has been grounded (though it has seldom been flown in recent years following a landing accident in 1992) for a major rebuild. Owned for several years by Gen William Lyons and flown as '7985', it was sold back to the Museum in 1995. It has already been flown by Steve Hinton from Santa Monica to the Mojave facility.

Book now!

Bookings are now being taken for two tours of the **North Kesteven Airfield Trail**, which are being held on 1 May and 28 August. This internationally acclaimed trail provides a fascinating day in Lincolnshire discovering the wartime airfields and operational RAF Stations. Anyone wanting more information about these tours should contact: **Sleaford Tourist Information Centre**, Money's Mill, Money's Yard, Sleaford. Tel: 01529 414294.

With new Allison engines to be fitted, it is hoped that the P-38 will be flying again by the end of the year.

● Construction of a full-scale model of a **Boulton Paul P6** has been started by the Boulton Paul Association. The P6 was designed in 1918 and was a conventional wood and fabric two-seat biplane to examine different wing aerofoil sections. It comprised a large number of Sopwith Camel parts and was powered by the RAF 1a air-cooled 90hp V-8 driving a four-blade propeller. Only one was built and it eventually became a company 'hack' as G-EACJ.

More disposals

The **Ministry of Defence** has offered a further batch of 'aviation items' for sale by tender and bids were due by early March. Included this time is a **Hawker Hunter F4** (WT746/7770M), without an engine, currently at the Army base at Saigton, Chester; **HS Harrier GR3** (XZ995/9220M) a BDRT airframe, again without engine, stored in a HAS at RAF St Mawgan; two **Jetstream T2s** — a Handley Page built example (XX480/G-AXXU) and a Scottish Aviation built aircraft (XX483), both formerly operated by 750 NAS at Culdrose, they are now stored at Shawbury and have been robbed of many useful parts. There are a couple of helicopters this time: a **Westland Wessex HU5** (XS491) at No 16 MU, RAF Stafford Fire Section, with its engine and components removed and the airframe in poor condition; and a **Westland Whirlwind HAR10** (8447M) — also at RAF Stafford Fire Section and in a similar condition to that of the Wessex.

Surprisingly the **Hawker Hunter T7** XL563 that has been on display outside the former RAF No 1 Officers' Mess at Farnborough for the past four years mounted on a plinth, is also being offered for sale, plinth included! This was the first production Hunter T7 and operated from Farnborough for over 30 years, most recently with the Institute of Aviation Medicine.

For this month's contributions to *Airview* and *Military Aircraft Markings* we would like to thank: W. Allen, R. Blewett, H. J. Curtis, R. Dunn, B. Dunnell, R. Fitton, N. Hitchman, G. Gaff, M. Jerram, M. V. Lowe, A. P. March, D. J. March, B. Martin, J. Mines, D. Moore, G. Moreman, F. B. Mormillo, E. A. Shackleton and M. Thomas. Also the publications *Aircraft Museums and Collections of the World*, *Airfield Review* (Airfield Research Group), *Air Link* (Lincolnshire Aviation Society), *BAC News* (Bristol Aero Collection), *British Aviation Review* (British Aviation Research Group), *International Auster Club News*, *Irish Air Letter*, *Military Aviation Review*, *Mil-Spotters* (Internet), *Osprey* (Solent Aviation Society), *Pacific Flyer*, *Popular Flying* (Journal of the PFA), *RAF News*, *Stansted Aviation News* (Stansted Aviation Society), *SWAG MAG* (South West Aviation Group), *The British Aviation Preservation Council Newsletter*, *The Catalina News* (The Catalina Society), *Vulcan News* (Vulcan Restoration Trust), *Warbirds Worldwide* and the *World Wide Web*.

Strenuous efforts are being made to get the Comet 4 XS235 back in the air, as seen here in happier days. PRM

Comet update

The **Havilland Comet XS235 Canopus** will not be airworthy in time to take part in the 50th anniversary of the type's first flight on 27 July. Based at Bruntingthorpe since October 1997, the Comet has been looked after very carefully by the **National Air Pageant** (NAP). There have been considerable difficulties following BAe's decision not to offer the

required support to an application for a C of A, since the CAA is insisting that this is the only way that *Canopus* will be allowed to fly, and will not consider an application for a Permit to Fly. Overhaul of the Rolls-Royce Avon engines is also causing complications due to the lack of available tooling facilities.



Air Register

Compiled by ALAN J. WRIGHT

Restorations...Restorations...Restorations...Restorations...Restorations...Restorations...Restorations...

Reg	Type	C/n	Owner or operator
G-KYAK	Yakovlev Yak-C11	171101	M. Gainza (F-AZQI/G-KYAK)
G-MVXH	Microflight Spectrum	010	Medway Microlights Ltd
G-OWDB	HS125 Srs 700B	257040	Bizair Ltd (G-BYFO/HB-VMD/VP-BPE/VR-BPE/N47TJ/EC-ETI/EC-375/G-OWDB/HZ-RC1)
G-WINE	Thunder Ax7-77Z	472	S.M. Miles

Additions...Additions...Additions...Additions...Additions...Additions...Additions...

Reg	Type	C/n	Owner or operator
G-BYAX	Boeing 757-204	28834	Britannia Airways Ltd
G-BYDI	Cameron A-210 balloon	4495	N.J. Appleton
G-BYDP	Fokker 100	11321	Gill Airways Ltd (N132ML/SE-DUA/PH-RRG/G-FIOS/PH-EZA)
G-BYEV	Cessna 172R	80663	Wycombe Air Centre Ltd (N2377J)
G-BYFC	Jabiru SK	274-13344	A.C.N. Freeman
G-BYFF	Pegasus Quantum 15-912	7500	Kemble Flying Club
G-BYFI	CFM Starstreak Shadow SA	206-13300	D.G. Cook
G-BYFL	Diamond HK 36 TTS	36623	Seahawk Gliding Club
G-BYFM	Jodel DR1050/M1	304-13237	A.J. Roxburgh
G-BYFN	Thruster T600N	9029-T600N-030	Thruster Air Services Ltd
G-BYFO	HS125 Srs 700B	257040	Bizair Ltd (HB-VMD/VP-BPE/VR-BPE/N47TJ/EC-ETI/EC-375/G-OWDB/HZ-RC1)

G-BYFV	Team Minimax 91	186-13431	W.E. Gillham
G-BYGE	Boeing 747-436	28858	British Airways
G-BYGF	Boeing 747-436	25824	British Airways
G-BYHM	BAe125 Srs 800B	258233	Corporate Aircraft Leasing Ltd (VP-BTM/VR-BTM-D-CAVW)
G-BYIA	Jabiru SK	274-13436	M.F. Cottam
G-BYIG	Renegade Spirit	188-12519	J. Hatswell
G-BYIK	Shaw Europa	247-12771	P.M. Davis
G-BYIP	Pitts S-2A Special	2244	Hampshire Aeroplane Co Ltd (N108WA)
G-BYIR	Pitts S-1S Special	1-0063	Hampshire Aeroplane Co Ltd (N103WA)
G-BYIS	Pegasus Quantum 15-912	7508	Light Flight Ltd
G-BYIZ	Pegasus Quantum 15-912	7504	J.D. Gray
G-BYKZ	Sky 140-24 balloon	147	D.J. Head
G-CHSU	Eurocopter EC-135T-1	0079	McAlpine Helicopters Ltd
G-CITZ	Bell 206B JetRanger 2	1997	Euro Executive Jet Ltd (G-BRTB/N9936K)
G-DEBK	BAe 146-200	E2012	Debonair Airways (C-FHAV/N601AW)
G-DUSK	DH115 Vampire T11	15596	R.M.A. Robinson & R. Horsfield (XE856)
G-FCLH	Boeing 757-28A	26274	Flying Colours Airlines Ltd (N751LF/EI-CLU/N161LF)
G-GIRY	AG-5B Tiger	10146	M.J. Sparshatt Worley (F-GIRY)
G-INGE	Thruster T600N	9039-T600N-033	Thruster Air Services Ltd

G-ISPL	Robinson R22 Mariner	1771M	Selectpile Ltd (SE-JAL)
G-JCMW	Rand KR-2	129-11064	M. Wildish
G-MZOX	Letov LK-2M Sluka	263-13415	C.M. James
G-NADS	Team Minimax 91	186-12995	P.M. Spencer
G-NESV	Eurocopter EC-135T-1	0067	McAlpine Helicopters Ltd
G-OAJB	Cyclone AX2000	7281	A.J. Blackwell (G-MZFJ)
G-OAPE	Cessna T303	00245	Ci Travel (Holdings) Ltd (N303MF)
G-OBVH	Boeing 767-304ER	28883	Britannia Airways Ltd
G-OPYE	Cessna 172S	8059	Pye Consulting Group Ltd (N653SP)
G-OSIP	Robinson R-22B	2916	Heli Air Ltd
G-OSMD	Bell 206B JetRanger 2	2034	Elite Helicopters (G-LTEK/G-BMIB/ZS-HGH)
G-OSMS	Robinson R-22B	1528	Speed Services PLC (G-BXYW/HA-MIU/N528SH)
G-OZAP	Hughes 369HS	33-0461S	G.R. Lloyd (G-FBHH/N2186K/PK-AVH/PK-PDO)

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G-RVDJ	Van's RV-6	181-12938	J.D. Jewitt
G-RVMJ	Van's RV-4	181-13433	M.J. de Ruiter
G-SBMO	Robin R2160	116	D. Henderson (EI-BMO/SE-GSZ)
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G-SSWU	Short SD3-30 Variant 100	SH3076	Streamline Aviation (SW) Ltd (C-FYXF/G-BIYH/N183AP/N338MV)
G-THEO	Team Minimax 91	186-13099	T. Willford
G-VIIP	Boeing 777-236	29321	British Airways
G-XSDJ	Shaw Europa XS	247-13378	D.N. Joyce
G-XWWF	Lindstrand LBL-56A balloon	595	D.D. Maimone

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G-ARZM	D31 Turbulent	581	Permanently withdrawn from use (PWFU)
G-ASAM	D31 Turbulent	595	PWFU
G-BDZY	Luton LA-4A Minor	842	PWFU
G-BHVC	Cessna 172RG	0550	Transferred to US
G-BKVN	PA-23 Aztec 250F	8054005	Transferred to US
G-BKYJ	Boeing 737-236	23188	Transferred to US
G-BPAO	Air Command 503 Commander	G/04-1097	PWFU
G-BPCY	PA-34-200T Seneca II	7970198	PWFU
G-BRTB	Bell 206B JetRanger 2	1997	Reregistered G-CITZ
G-BRTC	Cessna 150G	65996	PWFU
G-BRWC	Cessna 152	81918	PWFU
G-BSMP	PA-34-220T Seneca III	3448007	Transferred to Denmark
G-BTUD	CFM Image	222-12012	PWFU
G-BUWN	Lindstrand LBL-180A balloon	025	Transferred to US
G-BUWO	Lindstrand LBL-240A balloon	026	Transferred to US
G-BVCV	Fairchild M62A Cornell	T42-3418	Destroyed
G-BVGC	Cessna 411A	0274	PWFU
G-BVKN	Sikorsky S-76A	760090	Transferred to Australia
G-BWEX	Domier 228-202K	8085	Transferred to Germany
G-BWJO	BN-2B-20 Islander	2294	Transferred to Australia
G-BWSW	Yakovlev Yak-52	866807	Destroyed
G-BXLJ	Cessna 172M	67065	Destroyed
G-BXLM	BAe Jetstream 3108	645	Transferred to US
G-BXNP	Airbus A321-211	775	Transferred to Japan
G-BXWM	BAe Jetstream 4124	41102	Transferred to Hong Kong
G-BXWN	BAe Jetstream 4124	41104	Transferred to Hong Kong
G-BXYW	Robinson R-22B	1528	Reregistered G-OSMS
G-BYDX	AG-5B Tiger	10051	Transferred to US
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G-INTC	Robinson R-22B	1243	Destroyed
G-LTEK	Bell 206B JetRanger 2	2034	Reregistered G-OSMD
G-MBSF	Ultraflight Mirage II	234	PWFU
G-MJPC	American Aerolights Double Eagle 430B	PHH-01	PWFU
G-MNKN	Skycraft Scout Mk III	410	PWFU
G-MZEF	Mainair Blade	1094-0896-7	Destroyed
G-OBHO	Short SD3-60 Variant 100	SH3713	Transferred to Eire
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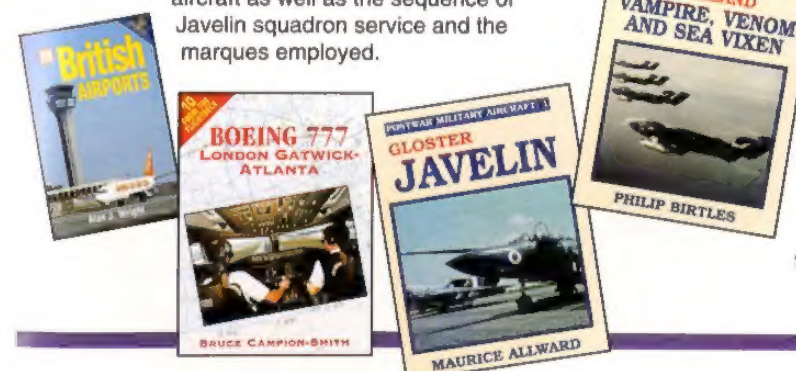
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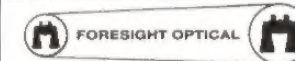
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